

COMMERCIAL FISHERIES REVIEW

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COMMERCIAL FISHERIES REVIEW



A review of developments and news of the fishery industries
prepared in the BUREAU OF COMMERCIAL FISHERIES.

Joseph Pileggi, Editor
G. A. Albano and H. Beasley, Assistant Editors

Address correspondence and requests to the: Fishery Market News Service, U. S. Bureau of Commercial Fisheries, 1815 North Fort Myer Drive, Room 510, Arlington, Va. 22209.

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TOP HONORS GO TO INTERIOR DEPARTMENT FISHERY RECIPE BOOKLET

The fishery recipe booklet Fish and Shellfish Over the Coals, issued by the U. S. Department of the Interior's Bureau of Commercial Fisheries, was one of three of that Department's publications awarded top honors

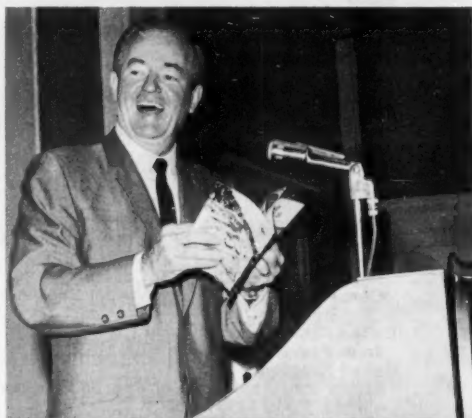


Fig. 1 - Vice President Humphrey comments enthusiastically on Fish and Shellfish Over the Coals.

as outstanding publications of their kind in the 1966 Federal Editors Association's Publications contest. The awards were made in Washington, D. C., on June 21, 1966, by Vice President Hubert H. Humphrey and John W. Macy, Jr., chairman of the Civil Service Commission.

The Bureau's fishery recipe booklet received the award as the best full-color publication. The other honors to Interior publications were for The Natural Resources of Utah, as the best popular publication in a series, and Aquatic Pests on Irrigation Systems, as the best technical publication.

Fish and Shellfish Over the Coals was acclaimed the outstanding United States Government publication released in 1965 in the full color category. The Bureau's Branch of Marketing which created the booklet, was awarded the Blue Pencil Highest Achievement Award. Vice President Humphrey made many favorable comments regarding the booklet. He said, "I want to tell you that I just wanted to go right out on the seashore after reading it. It is really great."



Fig. 2 - John W. Macy, Jr. presents the Blue Pencil Highest Achievement Award to Charles Butler, the Bureau's Assistant Director for Industrial Research.

Fish and Shellfish Over the Coals is a 24-page illustrated recipe booklet, one of a series presenting appealing and appetizing ways of preparing fish and shellfish. It is an epicurean's delight, and there is no doubt about that. It can be purchased for 40 cents from the Superintendent of Documents, U.S. Government Printing Office, Washington, D. C. 20402.

All three publications that were honored were judged on the basis of appearance, organization, presentation of material, readability, suitability to purpose, and thoughtful use of space, paper, and type.

COMMERCIAL FISHERIES REVIEW

Washington, D. C.

THE INDUSTRIAL FISHERIES OF TOMORROW--CHARTING THE COURSE^{1/}

By Donald L. McKernan

I am grateful for the opportunity to attend the first Annual Meeting of the National Fish Meal and Oil Association. I view with mixed feelings the passing of an era--the Virginia Fishermen's Association meetings--the passing almost of a tradition. But, that is progress; and the new organization is obviously designed to be broad in scope and to be "good" for the industry because it is more national in character.

It was in February 1958 that I first spoke before the Virginia Fishermen's Association. At that time I pleaded for support for a national program. It appeared at that time that the industrial fishery of this country was in for trouble, and I said at that time, "It looks to me our most difficult period lies immediately ahead." I urged us to quit being defensive and go on the offensive in our fisheries. Much fish has been processed since then. I've also been wrong a good many times since, but I wasn't wrong when I made that statement; and it can be made again with the same force and conviction. American fisheries prosper when we compete with other forms and sources of protein economically. When we don't, we lose markets to other forms of protein, whether the fish be in the form of a high protein meal or human food.

When I spoke to you before, back in 1958, your production of meal was not much different from this past year (1965)--248,000 tons. Imports were less than one-half of this production, and prices were good. Things have changed. Not long after my first appearance before you, in late 1959 and early 1960 the world price of fish meal began to decline. The industry was in trouble, and the catch of menhaden was high.

Many in this room well remember the efforts of Government and industry to rapidly organize a world conference on the subject of the production and use of fish meal. Such a conference was held in Rome in late March of 1961. It was a useful conference and brought together industry and scientific leaders from all important producers and users of fish meal.

A most useful exchange of views occurred, and at that time in fact--despite the uneconomic conditions of the industry which preceded the

^{1/}An address given by Donald L. McKernan, Director, Bureau of Commercial Fisheries, U. S. Department of the Interior, at the First Annual Meeting of the National Fish Meal and Oil Association, Norfolk, Va., February 27-March 1, 1966.



Fig. 1 - A large menhaden fishing vessel at the Reedville, Va., dock of an industrial fish plant.

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conference--cautious optimism prevailed among industry and Government leaders at the conference.

Much has happened since this meeting. Our own production of fish meal from domestic sources reached a peak during the early 1960's but has declined since. On the other hand, consumption of fish meal in this country has continued to increase through 1964, with the domestic production of 235,000 tons being only one-third of the total apparent consumption of 674,000 tons. Thus, during the past 5 years, our own production has become a minor source of the fish meal used in the United States. In fact, the 440,000 tons of meal imported in 1964 was a new record; a record not equaled in 1965, however, mainly due to a scarcity of fish and increasingly heavy worldwide demands.

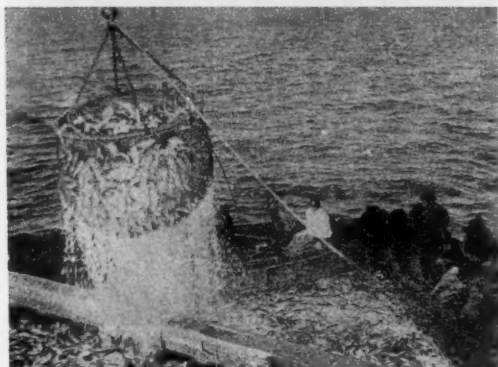


Fig. 2 - Brailing menhaden from the pocket or bunt of a purse seine. More modern purse seiners are now equipped with large suction hoses to transfer the fish from the net to the vessel.

tons of meal. This surprises me, for I would have thought that world consumption would have increased at a higher rate than in the United States.

With this background I would like to look for a moment at the potential world stocks of fish suitable for fish meal production. The better known large stocks of herring-like fishes are being fished close to their capacity--the menhaden, Norwegian herring, Peruvian anchovy, Japanese herring, pilchard, and so on. The phenomenal growth of the Peruvian fishery seems to have reached a peak. Some scientists believe that it was overfished at about 9 million tons in 1964, and this led to the 1965 reduction in catch. That may have been the case; at least, maximum growth of that fishery has occurred and the world is going to have to look elsewhere to find more fish to increase fish meal production.

Can it be done? Here at home, our industrial fish catch has declined. This decline--as everyone knows--has occurred because of the serious decline of the Atlantic coast menhaden stocks in 1963. Some improvement in these stocks might be predicted, although no one believes we are going to vastly increase our average yield of menhaden from the Atlantic and Gulf combined.

The anchovy stocks off California are a potential source of increased production, although at present, State laws and other economic problems are hampering the development of this fishery. Theoretically it might sustain a yield of 200,000 to 300,000 tons annually.

The herring-like fishes of the Gulf of Mexico look promising as a source of supply of industrial fish. Hake on both coasts appear abundant and relatively underfished; thus, it seems reasonable that if the demand for fish meal continues high, the U. S. fishery could probably double its production of fish meal within the next 5 to 10 years.

Essentially the same is true elsewhere in the world. The oil sardine of the Western Indian Ocean and Red Sea, the sardines of the Gulf of Guinea, the stocks of herring-like fishes off South Africa and the east coasts of Africa and South America all lead me to believe that--

Prices have become dangerously high, as you all know, and world consumption of fish meal as poultry and stock feed might even decline if these prices continue. There are, however, those in the audience who are much more qualified than I am to discuss this point.

It is important to members of the National Fish Meal and Oil Association to be aware that the world production of fish meal fell in 1965 for the first time since the end of the war two decades ago. It is also pertinent to note that in 1960, our consumption of fish meal was about 20 percent of the world production of 2.1 million tons. In 1964 we also used almost 20 percent of the world supply of 3.6 million

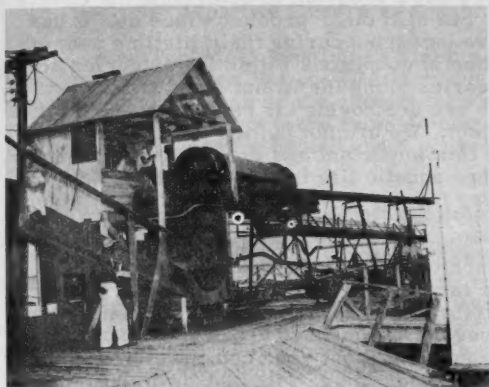


Fig. 3 - Menhaden being pumped from vessel to quarter box (a large steel container designed to hold about 1,000 fish).

even though fish meal production has temporarily declined--this decline need not continue. Thus, I conclude that the ocean resources are available and that world production of fish meal can at least double, and maybe quadruple, by the full use of these resources.

Let me talk for a moment about the product. There has been a big change in our use of industrial fish. First we used fish meal for fertilizer; and then for poultry and stock feeds, which continues to be the big user of industrial fish. In my view the demand for fish meal as a stock feed supplement will continue, although the form and value of fish meal will continue to improve.

Another use for industrial fish products has become common in recent months. That is the use of a more refined and often extracted meal for petfoods. The product is thus upgraded and the value increased further.

Now, another product has been produced from the industrial fishery. A fish protein concentrate (FPC) for human food has been developed and submitted to the Food and Drug Administration (FDA). Secretary Udall, this past week, sent our findings to Food and Drug along with a petition for the use of FPC as a food additive. The petition will be published this week in the Federal Register and we hope for a favorable response from FDA within a short time.

A distinguished committee of experts from the National Academy of Sciences has given this product its wholehearted blessing, and another important use for fish--we hope--will result with yet a higher value. Without question even more and more valuable products are possible in the future.

Yet all is not good. Problems plague us on all sides; not insurmountable ones, yet problems which might well prevent us from accomplishing our goal of increased harvests and more valuable products.

The resource base for the U. S. industrial fishery is in a tenuous condition. The primary catch depends mainly upon menhaden taken along the Atlantic coast and in the Gulf of Mexico. Both of these resources are being fished very intensively and there is a grave question as to whether they can sustain the current level of effort.

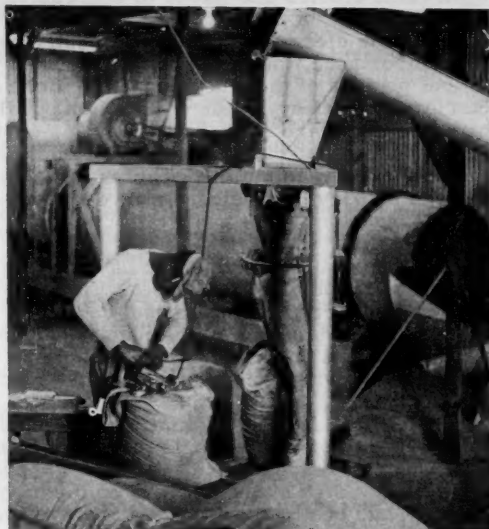


Fig. 4 - Shows fish meal being sacked in a menhaden industrial products plant.

Expensive and time-consuming research is required to answer this question. We have begun these studies and intend to aggressively carry out a program to determine the effects of the fisheries on the industrial fish populations. But still other problems face us. It has become quite clear that menhaden require extensive estuaries during their lifetime and, of equal importance, they require favorable environmental conditions within the estuaries during critical periods of their development. But the estuaries along the Atlantic and Gulf coasts are deteriorating. Heavy loads of pollution of all kinds are destroying the estuaries, and physical changes by man are further altering this environment. We are not putting enough effort into studies of the estuaries, and we are rapidly losing this important and productive environment. It seems unlikely to me that species of fish and other aquatic life important to man, which inhabit the estuary, can adjust to the degree necessary for survival under these rapidly deteriorating conditions.

In recent months, the public has been further prejudiced against the industrial fisheries along the Atlantic and Gulf coasts. To some extent the problem has arisen because of negligence on the part of fishing vessel captains. So, to the extent that the industrial fishery operates prudently, taking into account other public uses of the inshore areas and resources, and to the extent that the public can be more fully informed about your conservative fishing practices, you will avoid public criticism and improve your image with conservation groups.

Then, there is the constant threat of foreign fishing fleets off our coasts. While at the moment there appears to be no threat to the menhaden fishery, this could change overnight. It is likely that menhaden can be found in concentrations beyond our territorial limits and could be harvested by these fleets on the high seas. Much more thought needs to be given as to how we can best protect our special interests; and it behooves us--Government as well as industry--to make sure that we do not wait too long.

Editor's Note: The U. S. menhaden catch in 1965 was 1.7 billion pounds and accounted for 36 percent of the total catch of all species. U. S. fish meal production (menhaden, herring, tuna, etc.) in 1965 totaled 253,400 tons; imports of fish meal and scrap in that year amounted to 270,666 tons.

Notice of the Department of the Interior's petition to the Food and Drug Administration to approve as a food additive a protein concentrate made from whole fish, was published in the Federal Register, March 2, 1966.



Created in 1849, the Department of the Interior--a department of conservation--is concerned with the management, conservation, and development of the Nation's water, fish, wildlife, mineral, forest, and park and recreational resources. It also has major responsibilities for Indian and Territorial affairs.

As the Nation's principal conservation agency, the Department works to assure that nonrenewable resources are developed and used wisely, that park and recreational resources are conserved for the future, and that renewable resources make their full contribution to the progress, prosperity, and security of the United States--now and in the future.



THIRD TECHNICAL MEETING ON FISHING BOATS

By Edward A. Schaefer* and Thomas Pross**

The Third Technical Meeting on Fishing Boats, arranged by the Food and Agriculture Organization of the United Nations (FAO), convened in Goteborg, Sweden, October 23-29, 1965. Six years had elapsed since the second such meeting, also arranged by FAO, convened in Rome, Italy. Some 350 persons from 44 countries registered for the Third Meeting and 32 technical papers were presented and discussed during the five days of technical sessions (October 25-29).

The meeting was concerned with the improvement of the design and efficiency of small fishing vessels (about 100 gross tons and less). The 1959 meeting had already dealt to a great extent with large fishing vessels. The 32 papers presented at the meeting along with written discussions were divided into the following main subjects: Techno-socio-economic boat problems, seakindliness and workability, engineering of inboards and outboards, new materials for vessels, design of boats under 20 gross tons, design of boats from 20 to 100 gross tons, and recent developments of fishing vessels. Various topics were included in the presentations and discussions were carried out under each major subject.

TECHNO-SOCIO-ECONOMIC BOAT PROBLEMS

It was brought out at the onset of the meeting by the Director of the FAO Fisheries Division that although much attention has been given to improvement of the design of small fishing vessels throughout the years, much remains to be done. Since 80 percent of the world's fish catch is taken on or near the Continental Shelves, the grounds are fished readily and economically by small vessels based on adjacent shores. The importance of small fishing vessels, therefore, cannot be overemphasized. Their design must be the subject of continuous study and improvement in order that those living from the sea may prosper as steadily as those living on the land.

We are all becoming aware that in many countries fishermen are in short supply. It was quite a surprise to those in attendance, however, to learn that Japan is experiencing considerable difficulty in this regard. During the past 10 years, the rate of increase in the Japanese economy has been about 10 percent each year. Consequently, considerable numbers of fishermen have been attracted to other industries. The decrease in the number of Japanese fishermen, most notable in the high-seas fleet, jumped from about 2 percent per year during 1956-61 to 5 percent during 1961-64. This has caused Japan to shift its emphasis from trying to produce more fish, to trying to maintain present production levels with smaller crews. Attention now is centered on accomplishing this through increased mechanization, such as remote-control systems of engines and propellers, as well as greater use of synthetic fiber nets to increase efficiency, and plastic hulls to reduce costs.

Various other techno-socio-economic factors influencing the design of fishing vessels were discussed, such as laws concerning equipment restrictions, vessel size, construction regulations, and licensing requirements for operating personnel.

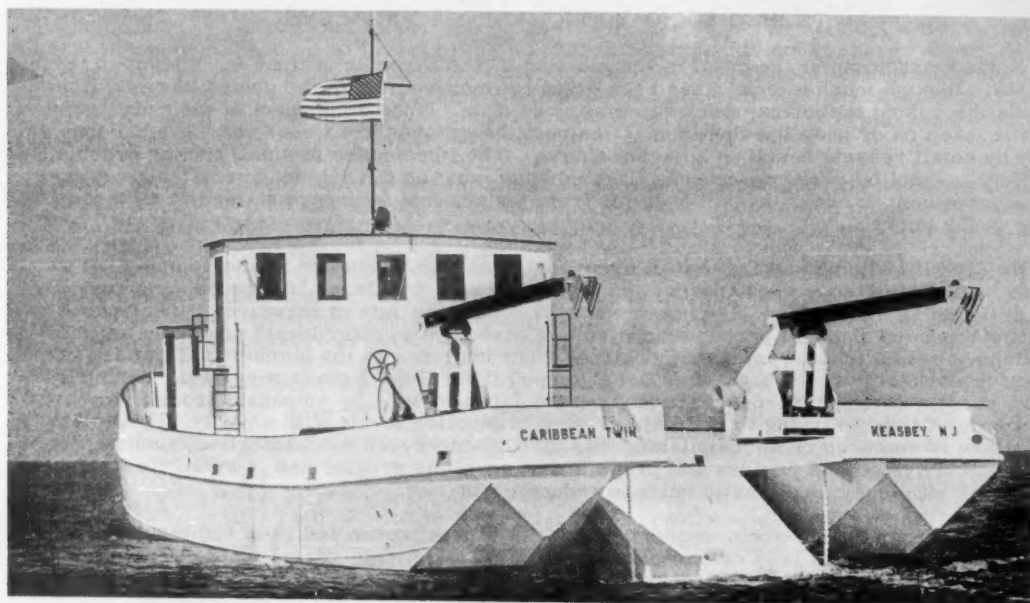
SEAKINDLINESS AND WORKABILITY

During recent years, considerable attention has been devoted to developing devices and designing fishing vessels to provide a steady platform for better and safer deck-working conditions as well as more comfortable living conditions at sea. It was brought out that most of the world's boatyards today build fishing boats from memory, experience, and rule of thumb.

*Chief, Branch of Exploratory Fishing, U.S. Department of the Interior, Bureau of Commercial Fisheries, Washington, D. C.

**Project Manager, Fish Boat Program, U.S. Maritime Administration, Washington, D. C.

This, of course, slows down the improvement of designs of small boats. Present procedures are quite understandable, however, when we consider that the development of the best hull form for a given set of operating circumstances would require months of work and perhaps 20 model tests. The tests alone would cost up to \$20,000. By assembling model test data over many years, however, FAO had enough information to record performance data on punch cards for analysis by a computer. Accordingly, all performance information, plus dimensional description of the boats, namely, beam over draft, length over beam, fullness of midship section, and power requirements in relation to speed, were fed into a digital computer at the National Physical Laboratory, Teddington, England. The resulting analysis of some 600 boats enabled the development of a formula for estimating the performance of any boat falling within the range of the data. Next, FAO naval architects asked the computer to recommend designs for specific optimum vessels on the basis of the 600 samples. The resulting answers enabled the naval architects to make drawings for idealized trawlers of 40-, 55-, and 70-foot lengths. Twelve-foot scale models were made and tested intensively in tanks. All three sizes checked out according to the computer's calculations and performed as expected. Considerable optimism was voiced over this development. The possibilities of the computer method for simplifying and improving the accuracy of the design, as well as producing boats that will have maximum sea-keeping qualities and fishing performance, are almost beyond comprehension.



The Caribbean Twin, a 70-foot steel catamaran, designed and built specifically for commercial fishing.

The use of powered catamarans as fishing vessels was the subject of considerable discussion, which was focused on the 70-foot steel catamaran Caribbean Twin, recently constructed in the United States. Although the vessel is designed primarily as a stern-ramp shrimp trawler, she has completed a research charter for Columbia University and now is fishing shrimp out of Port Isabel, Tex. Catamarans and outriggers equipped with sails and paddles, or both, have been used for thousands of years. However, powered catamarans are relatively new and the Caribbean Twin is believed to be the first such vessel designed and built specifically for commercial fishing. Advantages of the catamaran over single-hulled craft of the same length that led to the construction of the Caribbean Twin are: the large working platform, greater seakindliness under most sea conditions, increased stability, excellent maneuverability because of the twin engines, 20 percent greater cargo capacity, 50 percent

greater living capacity, and ease of conversion to a variety of types of fishing. Disadvantages lie in the increased cost (estimated at 15 percent) and the added cost and maintenance of a second diesel engine. Close tabs will be kept on operational experiences of this craft by many interested individuals.

At this point we might ask what has been done to develop devices to decrease roll thus providing a more steady working platform of small fishing vessels already constructed? Considerable discussion was devoted to recent work on application of passive free-surface tanks as roll damping devices, but no specific instance of installation or performance data aboard small fishing vessels was given. A rather simple device, commonly used for reducing the roll in vessels of the 30- to 75-foot range of the Pacific coast of the United States and Canada is the paravane-type stabilizer or "flopper stopper," suspended from outrigger poles. These have been used successfully in vessels to 86 feet long. It is estimated that on the U. S. Pacific Coast, nearly all salmon trollers, 90 percent of the albacore tuna trollers, and more than 50 percent of the otter trawlers use these stabilizers. The salmon troller uses stabilizers 24 hours a day while on the fishing grounds, and the albacore troller at night while drifting. Otter trawlers usually have stabilizers out while trawling. In recent years these devices have been used by most vessels engaged in the royal-red shrimp fishery off Florida's east coast and U. S. shrimp vessels off the northeast coast of South America. Their use permits dragging to be conducted during moderately rough sea conditions. Although one major boatyard building shrimp vessels includes paravane type stabilizers as standard equipment in all new construction, they are not always used when the vessels fish on the traditional Gulf of Mexico shrimp grounds. The use of these effective and inexpensive aids for roll damping has not yet spread to other fishing areas of the United States.

ENGINEERING OF INBOARDS AND OUTBOARDS

Discussions centered on the assumption that the approximate total number of fishing vessels is 1.5 million. Of the 70 percent, or about 1 million of those vessels still unmechanized, most are located in Asia, South America, and Africa. Until recently, small indigenous craft were mechanized by light inboard diesel engines ranging from 5 to 40 horsepower. Difficulties were encountered with inboard engines because of trouble with the stern gears either through poor design or, in well designed stern gear, poor boatbuilding and mishandling of boats. To avoid these problems, the outboard engine, characterized by being simple, easy to handle, safe, light, and comparatively cheap, was introduced. Continued success of outboards was found to depend a great deal on efficient engine servicing. It was believed by some that the market for outboard engines for small fishing boats is large enough to bring about an engine designed specifically for these vessels, but this has not taken place, and much remains to be done in this field.

NEW MATERIALS FOR VESSELS

As expected, discussions on materials for fishing vessels centered on Fiberglass Reinforced Plastic (FRP) and aluminum, which are rather recent newcomers in the construction of fishing vessels. Fiberglass Reinforced Plastic is now a proven hull material providing satisfactory service in commercial, naval, and pleasure craft throughout the world. Since 1946 in the United States, it has been used to construct 1 million pleasure craft and 2,000 naval craft. The largest fishing vessel to date of FRP has been a 74-foot side trawler constructed in South Africa, and the yard which built the vessel is contemplating construction of a 96-foot trawler. Plans call for construction of even larger fishing vessels of FRP in the foreseeable future.

At the present time, FRP for construction of fishing vessels is manufactured from two components, plastic polyester resin and a reinforcement of glass filaments. Although other plastics such as epoxy resins actually have more desirable physical and weathering characteristics, their current high price does not warrant their use for fishing vessels. Reported advantages of FRP over wood and steel are: less weight, excellent impact resistance, reduced maintenance, ease of repair, and excellent durability. In the United States, the cost of boats made of FRP is competitive with boats made of other materials if 5 or more hulls can

be made at one time. Lloyds Register of Shipping has prepared provisional rules that must be met by fishing vessels of FRP between 20 and 100 feet. The requirements will be considered specially in each case for FRP fishing craft over 100 feet long.

Numerous aluminum fishing vessels are used by salmon gill-net fishermen, as seine skiffs on salmon purse seiners, and as purse boats in menhaden fishing. A 57-foot salmon purse seiner and a 64-foot Australian spiny lobster boat have been built. In addition, possible use of aluminum for fishing boat applications, other than the hull, such as deck houses on steel vessels and fish hold linings and pen boards, were discussed. When compared with steel and wood, aluminum is reported to have advantages of less maintenance, lighter weight, and it requires no paint. The initial cost, however, of a 51-foot trawler, was estimated to be about 15 to 20 percent higher than a wood hull. Throughout the discussions, participants were reminded constantly that wood still plays an important role in the construction of fishing vessels of various sizes, and will continue to do so for many years to come.

A revolutionary method of fitting ship hulls with developable or wraparound skins of continuous metal sheets caused considerable comment. The new method of hull construction would save as much as 25 percent in labor costs for the average steel-hulled boat. Instead of fitting curves to surfaces as currently practiced, the method proposes to fit surfaces to curves. The group was informed, however, that this new system for developing hull surfaces, so radically different from any used so far, would not be mastered immediately by naval architects only familiar with traditional systems.

DESIGN OF BOATS UNDER 20 GROSS TONS

The group found it particularly revealing that high-speed fishing vessels of 30 to 40 feet have become well established in the salmon gill-net fisheries of Oregon, Washington, British Columbia, and Alaska. It is estimated that 1,000 gill-netters with the same general type of hull form and speed (10-20 knots) are now in service. The form is characterized by fine forward sections to minimize pounding and flat after sections for most efficient planing with a comparatively heavy planing hull and limited (280) horsepower. With rising cost of labor and improvement in boats, it seems likely that before many years extra high-speed craft will become increasingly important, and this type of hull may find application in other parts of the world. Comprehensive papers were also presented on fishing boats for developing countries and improvement of dugout canoes and other indigenous small craft.

DESIGN OF BOATS FROM 20 TO 100 GROSS TONS

Interest in combination vessels of the U. S. Pacific Coast type is increasing throughout the world. This type of vessel, ordinarily under 100 gross tons, is designed to purse seine for salmon, trawl for groundfish and shrimp, long-line for halibut, troll for tuna and salmon, and fish crab pots. Interest in this type of vessel on a worldwide basis has been heightened by the recent interest in small stern trawlers throughout the world, as well as the realization that capability to engage in several types of fisheries provides increased opportunities for efficient year-round operation. When rigged for trawling, it has always been common practice for these vessels to locate the gallows at each stern quarter of the vessel, exactly as modern stern trawlers. The Pacific coast vessels, however, lift the cod end over the side for emptying. In recent years, these vessels have been fitted with drums, and the entire net, with the exception of the cod end, is wound on the drum. This system greatly simplifies the trawling operation and drums have been installed on nearly all Pacific coast trawlers. Considerable interest was also shown in the use of a standard Florida-type shrimp trawler for tuna purse-seining and fish-trawling operations in New England. Fishing tactics play an important role in the success of the operation. For example, through experience it was ascertained that oftentimes while the vessel was scouting for tuna, it would encounter only schools of herring or mackerel that could not be taken with the large-mesh tuna seine. To assure having the correct net on board, an airplane is used for fish-scouting operations while the vessel remains at dockside. The airplane scouts waters adjacent to Provincetown, Mass., during the morning. If tuna are spotted the pilot radios the vessel and the tuna seine is loaded; if mackerel or herring are spotted the other seine is loaded. The pilot circles the schools until the vessel arrives and sets the seine.

Interest has also increased in the construction of multipurpose combination fishing vessels in the Gulf of Mexico. The mushrooming offshore oil industry in the Gulf of Mexico has required great numbers of vessels to serve its needs. Oil survey vessels are used for seismic explorations, to transport cargo, to ferry workers to and from offshore drilling platforms, and for general utility work. Because of this growing industry, a style of vessel was developed that is readily adaptable for use in shrimp and industrial fish trawling as well as snapper fishing. Their simplicity of design tends to reduce the cost and enables them to be built by even the smallest shipyards in the Gulf of Mexico area. This type of vessel has considerable application in other areas of the world where oil explorations as well as fishing operations are carried out.

RECENT DEVELOPMENTS OF FISHING VESSELS

Many of the recent developments were discussed but the main item discussed under this topic was the trend toward smaller stern trawlers. It was indicated that designing a small stern trawler is often more difficult than designing a large one, because the problems are greater, often more controversial and the requirements are contradictory. For example, a small boat skipper wants the biggest boat with the lowest tonnage and price. He wants the ease of remote-control of operations, but he wants mechanical simplicity. He also wants a multipurpose vessel on which he can change operations while at sea. It was the general consensus that compromises will be effected and the future importance of small stern trawlers should not be underestimated.

CONCLUSIONS

Probably the most significant developments on a worldwide basis and brought out at the meeting were:

- (1) Increased mechanization and increased efficiency of the fishing fleet of most countries will be necessary to offset the decreasing labor supply.
- (2) More steady platforms would provide seakindliness and permit more mechanization.
- (3) Use of computers in designing vessels is on a threshold of possible great development and will provide significant savings in time and money.
- (4) Plastics (FRP) will be used more and more on a worldwide basis.
- (5) Use of wraparound hull surface method may be significant in saving time and money.
- (6) The use of combination vessels will increase considerably.
- (7) The use of drums for trawl fishing will soon spread to many areas.

(List of papers presented at the Third Technical Meeting on Fishing Boats appears on page 10.)

LIST OF PAPERS PRESENTED AT THE THIRD TECHNICAL MEETING ON FISHING BOATS

Subject: TECHNO-SOCIO-ECONOMIC BOAT PROBLEMS

THE INFLUENCE OF SOCIAL AND ECONOMIC FACTORS ON DEVELOPMENT AND TECHNOLOGY IN THE FISHING SECTOR, by R. Hamisch, FAO.

TOPOGRAPHICAL FACTORS IN FISHING BOAT DESIGN, by K. Chidhambaram, India.

TECHNO-SOCIO-ECONOMIC PROBLEMS INVOLVED IN THE MECHANIZATION OF SMALL FISHING CRAFT IN JAPAN, by A. Takagi and Y. Hirasawa, Japan.

METHODE DE PROJET DES NOUVEAUX TYPES DE NAVIRES DE PECHE, by E. Gueroult, France.

Subject: SEAKINDLINESS AND WORKABILITY

A FREE SURFACE TANK AS AN ANIT-ROLLING DEVICE FOR FISHING VESSELS, by J. van den Bosch, Netherlands.

TECHNICAL SURVEY OF TRADITIONAL JAPANESE SMALL FISHING VESSELS, by N. Yokoyama, T. Tsuchiya, T. Kobayashi and Y. Kanayama, Japan.

A STATISTICAL ANALYSIS OF FAO RESISTANCE DATA FOR FISHING CRAFT, by D. Doust and J. Hayes, United Kingdom; and T. Tsuchiya, FAO.

NEW POSSIBILITIES FOR IMPROVEMENT IN THE DESIGN OF FISHING VESSELS, by J.-O. Traung, FAO; D. Doust and J. Hayes, United Kingdom.

MEASUREMENTS ON TWO INSHORE FISHING VESSELS, by M. Hatfield, United Kingdom.

CATAMARANS AS COMMERCIAL FISHING VESSELS, by F. MacLear, United States.

Subject: ENGINEERING: INBOARDS

TECHNICAL EXPERIENCES OF MECHANIZATION OF INDIGENOUS SMALL CRAFT, by E. Kvaran, FAO.

ENGINE TYPES AND MACHINERY INSTALLATIONS, by C. Borngrenstam, Sweden.

Subject: ENGINEERING: OUTBOARDS

OUTBOARD ENGINES IN COASTAL FISHING, by E. Estlander and N. Fuginami, FAO.

THE LOCATIONS AND SHAPE OF ENGINE WELLS IN DUGOUT CANOES, by T. Gillmer, United States; and O. Gulbrandsen, FAO.

Subject: MATERIALS

ALUMINUM AND ITS USE IN FISHING BOATS, by C. Leveau, United States.

DEVELOPABLE HULL SURFACES, by U. Kilgore, United States.

BOATYARD FACILITIES, by J. Fyson, FAO.

ALL PLASTIC FISHING VESSELS, by M. Takehana, Japan.

WOOD FOR FISHING VESSELS, by G. Pedersen, Denmark.

COMPARISON BETWEEN PLASTIC AND CONVENTIONAL BOAT-BUILDING MATERIALS, by D. Verweij, Netherlands.

A 110-FT. FIBERGLASS REINFORCED PLASTIC TRAWLER, by R. della Rocca, United States.

Subject: DESIGN OF BOATS UNDER 20 GROSS TONS

IMPROVEMENT OF DUGOUT CANOES AND OTHER INDIGENOUS SMALL CRAFT, by A. Thomas, Jamaica.

THE ADVANTAGES AND USES OF HIGH-SPEED FISHING CRAFT, by J. Brandlmayr, Canada.

FISHING BOATS FOR DEVELOPING FISHERIES, by P. Gurtner, FAO.

GREENLAND FISHING VESSELS AND CENTRALIZED DEVELOPMENT, by K. Rasmussen, Denmark.

Subject: DESIGN OF BOATS FROM 20 TO 100 GROSS TONS

REFRIGERATION FACILITIES IN SMALL FISHING BOAT, by S. Chigusa, Japan.

HYDRAULIC DECK MACHINERY, by F. Vibrans, Jr., and K. Bruttinger, United States.

RECENT UNITED STATES COMBINATION FISHING VESSELS, by L. Blount and E. Schaefer, United States.

SMALL STERN TRAWLERS, by W. Reid, Canada.

Subject: RECENT DEVELOPMENTS OF FISHING VESSELS

DEVELOPMENT OF JAPANESE STERN TRAWLERS, by T. Shimizu, Japan.

RECENT DEVELOPMENTS IN JAPANESE TUNA LONGLINERS, by J. Kazama, Japan.

NEW TRENDS IN STERN FISHING, by J. Minnee, Netherlands.

Note: See *Commercial Fisheries Review*, May 1965, p. 50; December 1965, p. 47.



HEAT INACTIVATION OF THIAMINASE IN WHOLE FISH

By R. H. Gnaedinger and R. A. Krzeczowski*

ABSTRACT

The time required at various temperatures to inactivate all of the thiaminase in several species of whole fish was studied. Some effects of pH and enzyme concentration on the time-temperature inactivation were also determined. Whole raw fish were ground, sealed in specially-constructed metal cans, heated at various temperatures for various lengths of time, and analyzed for residual thiaminase activity. Results indicate that a minimum time-temperature of 5 minutes at 180° F. is required to inactivate all the thiaminase of whole fish. Enzyme concentrations, pH, and possibly oil content of fish influence the time required to destroy thiaminase.

INTRODUCTION

The heating conditions employed by commercial mink-food producers and mink ranchers to destroy thiaminase in whole fish are empirical. The conditions are not based on predetermined time-temperature relations for the thermal inactivation of this antimetabolite. A common practice, for example, is to cook the fish at 180°-200° F. for 15 minutes (Borgstrom 1962).

Most of the specific data available on the time-temperature relation is found in various research publications dealing with the occurrence of thiaminase in fish, or with studies on the chemistry of the enzyme. Deutsch and Hasler (1943) used 15 minutes at 100° C. (212° F.) to inactivate thiaminase in whole fish and viscera homogenates. Sealock, Livermore, and Evans (1943) destroyed most of the thiaminase in carp by heating at 100° C. for 30 minutes. They found that with dilute or purified preparations, thiaminase can be destroyed completely in a bath of boiling water in 5 minutes. Melnick, Hochberg, and Oser (1945) used 20 minutes at 100° C. to destroy thiaminase in ground fish suspended in water at pH 4.5. Somogyi (1949) used only 10 minutes at 100° C. to destroy the thiaminase in a carp intestinal extract. Similarly, Kuusi (1963) used 10-30 minutes in a bath of boiling water to inactivate thiaminase in Baltic herring and bream.

The time-temperature conditions used by those researchers can be used, however, only as general guidelines by commercial processors. There appears to be no published data regarding minimum times and temperatures that are sufficient to inactivate all of the thiaminase in whole fish. Such data would be important in the development of improved fish-reduction methods that are designed to yield safe, high-quality products.

The purpose of this study was to determine minimum time-temperature relations required to inactivate all of the thiaminase in several species of fresh-water fish. Some effects of pH and enzyme concentration on time-temperature relations were also studied.

EXPERIMENTAL

PREPARATION OF WHOLE-FISH SAMPLES: Fresh whole fish were passed twice through a meat grinder, first using a $\frac{1}{4}$ -inch plate and finally using a $\frac{1}{8}$ -inch plate. The homogenous ground material was then immediately packed and sealed in metal 208 x 006 Thermal Death Time (T.D.T.) cans, was frozen, and stored at 0° F. until used. Sufficient ground material was used so that no air space remained in the cans. These cans (which have a capacity of about 20 grams) are specially constructed so that the entire contents can be heated (or cooled) very rapidly and uniformly, thereby eliminating the need to measure the internal temperature of the cans; thus, the internal temperature is assumed to be equal to the temperature of the heating medium.

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HEAT TREATMENT OF SAMPLES: The filled cans were removed from frozen storage and equilibrated in an ice-water bath prior to their being heated; thus, the starting temperature was about 32° F. for all samples. The cans were then submerged in a thermostatically-controlled water bath for the desired length of time and at the desired temperature. At the end of the heating period, the cans were immediately placed again in the ice-water bath until cooled. The samples were subsequently frozen and held at 0° F. until analyzed for residual thiaminase activity.

ANALYSES OF SAMPLES: Thiaminase analyses were carried out according to the procedure of Gnaedinger (1964). Proximate composition analyses were carried out according to the Association of Official Agricultural Chemists Official Methods of Analysis (1960).

RESULTS AND DISCUSSION

The times required to inactivate all of the thiaminase in various species of whole fish at various temperatures are shown in the table. In most cases, the results are reported as two numbers (for example, 3-4, which indicates that some activity was observed at 3 minutes but none at 4 minutes). Thiaminase activities of the unheated starting materials, the pH and proximate composition of the raw fish, including date and location of their capture, are also included in the table.

Time-Temperature Relationships of Inactivating Thiaminase in Whole Fish											
Species/	Date of Capture	Location	pH	Thiaminase Activity	Time to Inactivate Thiaminase at:						Proximate Composition
					200° F.	190° F.	180° F.	170° F.	160° F.	150° F.	Water Oil Ash Protein
				2/	(Minutes)						(Percentage) . . .
Bowfin	1/-/64	Arkansas	6.60	206	1-2	1-2	1-2	4	-	-	76.16 1.54 3.58 15.53
Carp	12/10/64	Lake Erie	6.75	2,003	2-3	3-4	4-5	9-10	105	-	71.59 9.56 3.15 13.97
Shad	10/28/64	Lake Erie	6.65	112	2-3	3-4	4-5	32	-	-	70.58 14.16 2.24 12.01
Smelt	10/28/64	Lake Erie	6.85	47	1	1	1	1	1	1-2	75.54 7.60 2.01 12.71
Shiner	12/3/64	Lake Michigan	6.70	1,418	1-2	1-2	1-2	2-3	4-5	-	69.90 11.92 2.22 12.99
Alewife A	11/-/64	Lake Michigan	6.90	173	1-2	2-3	4-5	26-27	-	-	71.99 13.49 1.89 11.20
Alewife B	11/-/64	Lake Michigan	5.9	124	1-2	2-3	4-5	74-75	-	-	70.15 13.30 2.39 11.87
Alewife C	11/-/64	Lake Michigan	8.2	162	1-2	2-3	3-4	3-4	-	-	70.63 13.27 2.82 10.86
Alewife fillets ^{3/}	11/-/64	Lake Michigan	6.4	152	1-2	1-2	1-2	6	-	-	71.63 13.78 1.26 11.72
Alewife viscera ^{4/}	12/3/64	Lake Michigan	6.9	572	2-3	3-4	6-7	45-46	-	-	70.57 16.15 1.96 9.34
Alewife diluted ^{3/}	11/-/64	Lake Michigan	6.9	152	1-2	2-3	3-4	7	-	-	85.38 6.76 1.06 5.83

1/Alewife (*Pomolobus pseudoharengus*); Bowfin (*Amia calva*); Carp (*Cyprinus carpio*); Shad (*Dorosoma cepedianum*); Smelt (*Osmerus mordax*); Shiner (*Notropis hudsonius*).
 2/Micrograms of thiamine hydrochloride destroyed in 20 minutes per gram of protein of the unheated raw fish.
 3/Low concentration of enzyme.
 4/High concentration of enzyme.

EFFECT OF TIME AND TEMPERATURE ON THIAMINASE DESTRUCTION: The results of this study indicate that a minimum time-temperature relation of 5 minutes at 180° F. is required to obtain a thiaminase-free product from whole raw fish. From the standpoint of commercial application, this relation implies that the coldest part of any fish particle must be held at 180° F. for at least 5 minutes at some time during processes relying upon heat to inactivate the antimetabolite. When fish offal (rather than whole fish) is being processed, the minimum time should be increased to at least 7 minutes at 180° F., as indicated by the results obtained in the use of alewife viscera.

At temperatures above 180° F., the thiaminases of different species of fish show relatively small differences in their heat labilities. Below 180° F. however, marked differences begin to appear. At 170° F., for example, the results indicate that the thiaminases of carp and shiner are destroyed much more readily than are those of whole alewife and shad, even though the latter two species had relatively lower initial thiaminase activities. In smelt, the species with the lowest activity, thiaminase was destroyed in less than 2 minutes, even at 150° F. Thus, processing conditions for this species would probably not have to be as severe as, for example, those for alewife. There was some indication that a very high oil content exerted a protective action against heat destruction of thiaminase, although exceptions were evident, notably that of the shiner. This species possessed both high initial activity and high oil content, but the thiaminase was destroyed in 5 minutes even at 160° F.

EFFECT OF ROOM-TEMPERATURE INCUBATION ON THIAMINASE DESTRUCTION: A test was conducted (the results of which are not shown in the table) to determine the stability of thiaminase at room-temperature incubation. Samples of ground whole alewife, carp, shad, shiner, and smelt (at their natural pH) were sealed in T.D.T. cans and stored at 73°-83° F. At monthly intervals, the samples were analyzed for residual activity. The samples, of course, were putrid when analyzed, and all the cans were greatly distended. Carp, shad, and shiner gave a positive thiaminase test even after 3 months of incubation. Smelt, which had a low initial enzyme activity, was inactive at the end of one month. Alewife, which was incubated for only 2 months, was still active at the end of that time. These results suggest that the thiaminase enzyme is not readily destroyed at room temperature by the various proteolytic enzymes of fish.

EFFECT OF ENZYME CONCENTRATION ON THIAMINASE DESTRUCTION: The initial activities of the unheated raw fish samples are expressed as the number of micrograms of thiamine hydrochloride destroyed per gram of protein in 20 minutes under the conditions of the assay procedure. The values are expressed on a protein basis so that some standard reference point can be assumed and comparisons between species can be made more meaningfully. As was indicated in a preceding paragraph, the initial activity of the raw fish is not necessarily related to the time required to destroy the enzyme when different species are compared. However, enzyme activity appears to be related to processing time when a single species is considered. Alewife viscera, for example, which had an initial activity of 572, required 46 minutes at 170° F. for total destruction of thiaminase; whereas, diluted alewife and alewife fillets (initial activity of 152 units) required only 7 minutes at 170° F.

EFFECT OF pH ON THIAMINASE DESTRUCTION: The pH values reported in the table are of the raw unheated fish, except in the cases of Alewife B and Alewife C, which were adjusted to 5.9 and 8.2 with HCl and NaOH, respectively, prior to heat treatment. All values were read by inserting the electrodes (glass and standard reference) of a pH meter into the ground fish. The results obtained with Alewife A, Alewife B, and Alewife C indicate that pH has some effect on thiaminase destruction. High pH tends to increase the heat lability of the enzyme; whereas, low pH tends to decrease its heat lability. As with the effect of enzyme concentration, the effect of pH was studied on only a single species, so no conclusions can be drawn on its effects between species.

CONCLUSIONS

A minimum time-temperature relation of 5 minutes at 180° F. is required to destroy all of the thiaminase in whole raw fish. At temperatures above 180° F., thiaminase is very heat labile; only small differences are evident between species. At temperatures below 180° F., however, the thiaminases of different species show marked differences in heat sensitivity. These differences are as yet unexplained, although they may be related in part to protection against heat destruction by a high content of oil.

Enzyme concentration (as determined by the initial activity in the raw fish) is not necessarily related to processing time when different species are compared, but it is related to processing time when members of a single species are compared.

The effects of pH on heat sensitivity of thiaminase was studied on alewife only. High pH tended to increase the heat lability of thiaminase; low pH tended to decrease the heat lability.

The thiaminase of canned raw fish, stored at room temperature, can remain active for at least 3 months.

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BOOKLET ON "HOW TO COOK CRABS"

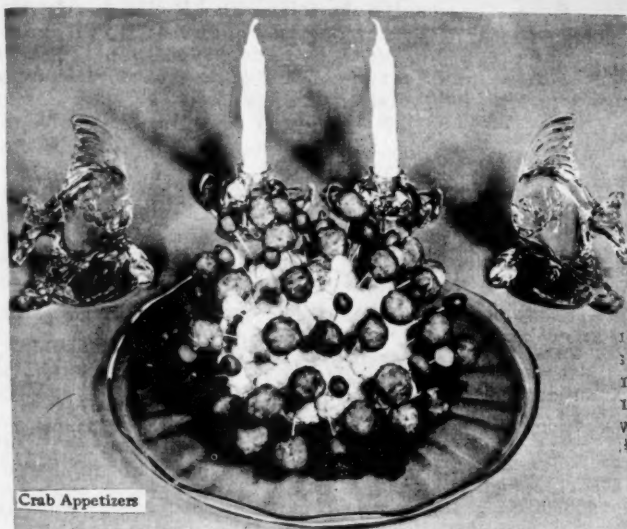
Crabs are one of our popular shellfish because of their tender meat and distinctive flavor. Crab meat also is an excellent source of high-quality proteins, vitamins, and minerals needed for good nutrition. Modern processing and marketing methods now make crabs available almost everywhere in the United States. Crabs are available in these market forms: live; cooked in the shell; cooked and frozen; fresh cooked meat; and canned meat.

As the booklet explains, four principal kinds of crabs are taken from the marine waters of the United States and Alaska. From the Atlantic and Gulf coasts come blue crabs which compose three-fourths of all the crabs marketed in this country. Dungeness crabs are found on the Pacific coast from Alaska to Mexico. King crabs come from the North Pacific off Alaska. Rock crabs are taken on the New England and California coasts. Of local importance are stone crabs in Florida and tanner crabs in Alaska.

The four principal kinds of crabs are pictured in the booklet and their approximate weights are listed. Complete illustrated instructions are given for picking the meat from blue crabs.

Some of the easy-to-prepare recipes which have been developed and kitchen-tested by U. S. Department of the Interior's Bureau of Commercial Fisheries staff of home economists are: Crab Louis, Crab Ravigote, Crab Newburg, Deviled Crab, Imperial Crab, Avocados Stuffed with Crab Meat, and Barbecued Crab Sandwiches.

Generously illustrated, *How to Cook Crabs*, Test Kitchen Series No. 10, may be purchased for 20 cents each from the Superintendent of Documents, Government Printing Office, Washington, D. C. 20402.



TRENDS AND DEVELOPMENTS

Alaska Fisheries Explorations and Gear Development

SHRIMP RESOURCES IN SOUTHEASTERN WATERS SURVEYED:

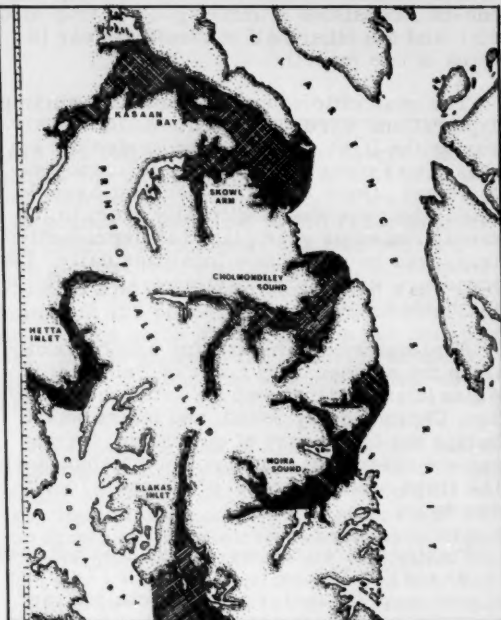
M/V "Little Lady" Cruise 66-1 (April 18-June 13, 1966): The exploratory fishing vessel, *Little Lady*, chartered by the Bureau of Commercial Fisheries, U. S. Department of the Interior, completed a 57-day exploratory shrimp cruise in June 1966 for spot (*Pandalus platyceros*) and coon-stripe shrimp (*Pandalus hypsinotus*). The vessel operated in the Cordova Bay vicinity and along the southeastern coast of Prince of Wales Island in south-east Alaska.

Principal objectives of the cruise were to: (1) locate commercial concentrations of spot and coon-stripe shrimp; (2) collect data on the distribution and abundance of those species; and (3) observe the relative fishing efficiency of 6 types of shrimp pots.

The gear experiment was designed to test the relative fishing efficiency of 6 different models of shrimp traps plus 2 variations in construction features. The six models of shrimp traps include:

(1) Rectangular wood lath trap, 18x18x30", iron bark frame covered with 1½" wide spruce lath. Two conical tunnels of 1½" stretch-mesh nylon web with 9"-10½" lead-in. Two-inch (inside diameter) white plastic rings were fastened at the tunnel apex (trap type #8).

(2) Rectangular metal frame trap, 18x18x30", reinforcing steel rod (¾") frame covered by burlap and 1½" stretch-mesh nylon web. Two conical tunnels constructed of ¾" stretched-mesh nylon web. Tunnel lead-in 13" (long, trap type #14) and 9" (short, trap type #9) with 2" (inside diameter) white nylon rings at the apex.



Shows area of operations during M/V *Little Lady* Cruise 66-1 (April 18-13, 1966).

(3) Plastic igloo trap, 24" in diameter and 10½" high (trap type #10).

(4) Rectangular plywood trap, 18x18x36", iron bark frame sheeted with ¾" plywood. Two sloping ramp tunnels were constructed of plywood frames covered with ¾" mesh nylon web. The tunnel openings were 1¼" deep by 18" wide (trap type #11).

(5) Rectangular plastic pipe frame trap, 18x18x36", ½" plastic PVC-type pipe covered with burlap (trap type #5), or ¾" nylon web (trap type #15), two conical tunnels constructed of ¾" nylon mesh, lead-in 15½", with 2" (inside diameter) white rings at the apex.

(6) Circular collapsible trap, frame constructed of $\frac{3}{8}$ " and $\frac{1}{2}$ " galvanized steel wire covered by $\frac{1}{4}$ " stretched mesh nylon web, four $2\frac{1}{4} \times 2\frac{7}{8}$ " oval tunnels spaced every 90° with short leads (trap type #13).

A total of 72 shrimp traps (12 of each model) was fished using the long-line method. A long line consisted of 6 traps attached to the groundrope by one-fathom dropper lines spaced at five-fathom intervals. Of the 12 long lines, one-half consisted of mixed gear (6 trap models), and the other half of identical gear (6 traps of one model).

The gear efficiency study and spot shrimp explorations were conducted simultaneously. During the first portion of the cruise the emphasis was placed on the gear efficiency experiment. Once a shrimp bed had been located, the gear was continually reset in the same area while gear placed in unproductive areas was moved to new localities daily. This procedure was followed while working in Hetta and Klakas Inlets.

Exploratory shrimp fishing was conducted along the southeastern coast of Prince of Wales Island and included the waters of Kasaan Bay, Cholmondeley Sound, and Moira Sound. During the latter part of the cruise, fishing was not restricted to areas of high abundance. The traps were moved to new fishing localities daily.

Fishing operations were conducted between the 8- and 103-fathom isobaths. All 12 strings of gear were hauled, emptied, rebaited, and reset daily. Usually the traps fished or soaked for 18 to 28 hours.

Catches from the 38 stations revealed large concentrations of spot shrimp in Hetta and Klakas Inlets and Cholmondeley and Moira Sounds. The catches ranged from 0 to 313 pounds per set (72 traps), and averaged 132

pounds per set. The total catch for the 38 stations was 5,018 pounds or 1.88 pounds per trap per set. Small catches of coon-stripe and pink shrimp (less than 2 pounds) occurred occasionally.

Eight stations were fished in Hetta Bay at depths from 12 to 103 fathoms. Good abundance of spot shrimp was found in the depth interval of 50 to 90 fathoms with the center of abundance occurring at 60 to 70 fathoms. The catch per station ranged from 45 to 263 pounds and averaged 164 pounds (or 2.3 pounds per trap per set).

Eleven stations were made in Klakas Inlet and just outside its entrance. Catches of spot shrimp ranged from 1 to 313 pounds per station and averaged 176 pounds (or 2.44 pounds per trap per set). Operations were conducted at depths from 15 to 92 fathoms and good abundance was found from 15 to 65 fathoms while the center of abundance was from 40 to 55 fathoms.

Six stations were fished in Kasaan Bay and Skowl Arm. Results indicated a low abundance of spot shrimp in those waters. Catches ranged from 0 to 102 pounds per station and averaged 35 pounds (or 0.49 pounds per trap per set). Explorations were conducted from 28 to 85 fathoms, with good abundance occurring between 46 and 62 fathoms.

Six stations in Cholmondeley Sound showed a high abundance of spot shrimp. Catches ranged from 38 to 263 pounds per station and averaged 126 pounds (or 1.75 pounds per trap per set). Station depths ranged between 32 and 90 fathoms. Good concentrations were found at depths from 35 to 90 fathoms, with the center of abundance occurring at 50 to 75 fathoms.

One station in Johnson Inlet and just outside its entrance resulted in a very poor showing (3 pounds).

Table 1 - Average Catch Per Station, Catch Per Trap Per Station, Depths Fished, Depths of Good Abundance and Depth of the Center of Abundance

Area	Total Catch	Stations	Range of Catches	Average Catch Per Station	Average Catch Per Trap Per Set	Depth Fished	Good Abundance/	Center of Abundance
	Pounds	No.			(Pounds)		(Fathoms)	
Hetta Inlet	1,310	8	45-263	164	2.3	12 - 103	50 - 90	60 - 70
Klakas Inlet	1,935	11	1-313	176	2.44	15 - 92	15 - 65	40 - 55
Kasaan Bay	210	6	0-102	35	0.49	28 - 85	35 - 90	
Cholmondeley Sound	758	6	38-263	126	1.75	32 - 90	32 - 90	50 - 75
Johnson Inlet	3	1	3	3	-	20 - 87	-	-
Moira Sound	802	6	38-238	134	1.86	25 - 85	40 - 73	50 - 65
Total	5,018	38	0-313	132	1.88	12 - 103	15 - 90	40 - 75

1/One (1) string producing 10 or more pounds of spot shrimp.

Table 2 - Average Catch of Spot Shrimp Per Trap Per Set and the Average Number of Whole Shrimp Per Pound by Trap Model

Trap Type ^{1/}	Total Pounds	Units of Effort	Average Catch/Trap/Set In Pounds	No. of Shrimp	Average No. of Whole Shrimp/Pound
9	355	135	2.63	5,624	15.9
14	210	94	2.23	3,130	14.9
8	477	220	2.17	7,239	15.2
11	470	220	2.14	5,700	12.1
13	468	235	1.99	6,134	13.1
12	178	110	1.62	3,147	17.7
10	349	225	1.55	4,454	12.8
15	125	119	1.05	2,040	16.4

1/ 9. Metal frame, burlap covered, short tunnel.
 14. Metal frame, burlap covered, long tunnel.
 8. Wood lath trap, short tunnel.
 11. Plywood trap, sloping tunnel.
 13. Circular collapsible trap.
 12. Plastic pipe frame trap, burlap covered.
 10. Plastic igloo trap.
 15. Plastic pipe frame trap, $\frac{3}{8}$ " nylon web covered.

Six stations in Moira Sound showed a good abundance of spot shrimp. Catches ranged from 38 to 238 pounds and averaged 134 pounds per station (or 1.86 per trap per set). The traps were set at depths from 25 to 85 fathoms. Good abundance of spot shrimp were found from 40 to 73 fathoms, with the center of abundance occurring between 50 and 65 fathoms.

Results of the shrimp explorations indicated commercial concentrations of spot shrimp are available in Hetta and Klakas Inlets, and Cholmondeley and Moira Sound. Two commercial vessels were fishing those areas at the time.

Data used in the analysis of the gear efficiency study were restricted to observations made on the six strings of mixed gear. Analysis of the data collected at the 38 stations showed that the metal frame trap equipped with short and long tunnels were rated first and second, respectively. The short tunnel, metal frame, fished 135 times caught 354 pounds for an average catch of 2.63 pounds per trap per set, while the long tunnel trap was fished 94 times and caught 210 pounds or an average catch of 2.23 pounds per trap per set. The third most efficient trap was the wood lath, which caught 477 pounds of shrimp in 220 units of effort for an average catch of 2.17 pounds per trap per set. This trap was followed closely by the plywood trap which took 470 pounds of spot shrimp in 220 units of effort for an average catch of 2.14 pounds per trap per set. The circular collapsible trap was the 5th most efficient and caught 468 pounds in 235 units of effort for an average catch of 1.99 pounds per trap per set. The 6th and 7th most efficient traps were the plastic pipe frame, burlap covered, and the plastic igloo trap, respectively. The plastic pipe

trap was fished 110 times and caught 178 pounds for an average catch of 1.62 pounds per trap per set, while the igloo trap caught 349 pounds in 225 units of effort for an average catch of 1.55 pounds per trap per set. The poorest trap was the plastic pipe frame covered with $\frac{3}{8}$ " woven mesh nylon web. This trap took 125 pounds in 119 units of effort for an average catch of 1.05 pounds per trap per set. In this analysis the criterion used for the most efficient trap was the highest average catch per unit of effort.

The average size of shrimp caught varied with trap type. The larger entry tunnels caught larger shrimp. The 2" (inside diameter) entry rings which were used on most traps were too small and the diameter should be enlarged. The optimum tunnel size is not yet known. The average size of the shrimp taken in the trap with the two-inch tunnels ranged from 14.9 to 17.7 whole shrimp per pound. The igloo, plywood, and circular collapsible traps which had larger openings caught shrimp which averaged from 12.1 to 13.1 whole shrimp per pound.

Note: See *Commercial Fisheries Review*, July 1966 p. 14, December 1965 p. 25.



California

VARIOUS SPECIES OF FISH COLLECTED FOR BIOLOGICAL STUDIES:

M/V "N. B. Scofield" Cruise 66-S-1 (February 10-24, 1966): The purpose of this cruise by the California Department of Fish and Game research vessel N. B. Scofield was to: (1) collect eye lenses and blood smears from different fish species caught at widely sep-

arated locations, and (2) obtain pathological specimens, especially tumors, from marine species. The area of operation was in the waters of the southern California Channel-lands and offshore along the coast of Baja California.

Eye lenses, taken from 36 species caught at 15 locations, were analyzed electrophoretically to determine the characteristics of their protein composition. The information was to be used in identifying genetically-distinct populations and in studying phylogenetic relationships.

A series of 4 blood smears was taken from 20 species of fish. They were to be used in hematological studies of different taxonomic groups. During the cruise, a suspect melanistic sarcoma was collected from a bocaccio (*Sebastes paucispinus*).

Note: See Commercial Fisheries Review, January 1966 p. 17.

SURVEY OF SHRIMP RESOURCES IN COASTAL WATERS CONTINUED:

M/V "N. B. Scofield" Cruise 66-S-2 (March 18-April 27, 1966): The objectives of this cruise by the research vessel N. B. Scofield in the coastal waters from the Oregon border to Eureka, Calif., were to: (1) randomly sample concentrations of pink shrimp (*Pandalus jordanii*) for determining population estimates and natural mortality rates; (2) determine size, sex, and weight of shrimp; (3) examine Pacific hake (*Merluccius productus*) stomachs for relative abundance studies of pink shrimp; (4) sample surface and intermediate waters for juvenile shrimp; (5) sample the bottom fauna of the shrimp bed; and (6) save all rare or unusual invertebrates and fishes for the State Fisheries Laboratory, Terminal Island, and various collections.

The 153 tows made during the cruise were distributed at random over the 270 square-mile survey area between the mouth of Mad River and the Oregon border. Fishing depths ranged from 38 to 110 fathoms. A semi-balloon Gulf of Mexico shrimp trawl with a 41-foot head rope and a one-inch stretch mesh net was used. A $\frac{1}{2}$ -inch stretch-mesh liner was used in the cod end of the net to prevent escapement of small one-year-old shrimp.

One unchartered snag was encountered west of Redding Rock in 36 fathoms. This resulted in the loss of a net and otter boards.

Approximately 102 square miles of the survey area contained sufficient concentrations to provide about 50 pounds of shrimp an hour using commercial size nets. About 36 square miles of that area yielded catches equivalent to 300 pounds or more an hour if commercial size nets were used.

Excluding catches under 34 pounds an hour, the average catch was 355 pounds and ranged from 35 to 3,549 pounds. The 270-square mile survey area contained an estimated 5.1 million pounds of shrimp. Counts per pound ranged from 70 to 299 with a mean of 147. About 72 percent of the shrimp population was located 12 miles or less from shore.

A total of 263 Pacific hake stomachs were examined for pink shrimp; the stomachs contained 135 identifiable shrimp.

Unusual fish species collected during the survey included: 2 bearded eelpouts (*Lycoperma barbatum*); 1 rough ronquil (*Rathbunella allenii*); 1 smooth tongue (*Leuroglossus stilbius*); 1 short-fin eelpout (*Lycodes brevipes*); 1 red brotula (*Brosomphycis marginata*); 1 blue spotted poacher (*Xeneretmus triacanthus*); and 1 tadpole snailfish (*Nectoliparis pelagicus*).

Note: See Commercial Fisheries Review, March 1966 p. 21.

OCEANOGRAPHIC STUDIES IN CALIFORNIA COASTAL WATERS:

M/V "N. B. Scofield" Cruise 66-S-3 (April 30-May 1, 1966): To determine the salinity and temperature of waters adjacent to proposed marine laboratory sites which may be used in conjunction with the temperature and salinity profiles of Monterey Bay reported by Hopkins Marine Station, was the purpose of this cruise by the research vessel N. B. Scofield. The vessel operated in California coastal waters from Santa Cruz to Davenport Landing.

Sea surface temperatures were continuously recorded by thermograph. Water samples and bathythermograph (BT) casts were made every 2 miles along the 10-, 20-, and 40-fathom contours from Santa Cruz Point to El Jarro Point.

The lowest surface temperature (53° F.) was recorded at one of the stations worked. The highest temperature (58.8° F.) was re-

corded inshore near Santa Cruz Point. Temperatures were fairly uniform at offshore stations, and ranged between 57° and 58° F; the temperature inside Santa Cruz Harbor was 60.8° F.

Salinities ranged from 32.9 to 34.2, and were generally higher near shore as a result of upwelling occurring at two stations covered.

Bathythermograph casts made at 8 stations showed a strong thermal gradient between the surface and 150 feet. A clear thermocline was evident, beginning at 30 feet below the surface at a number of stations.

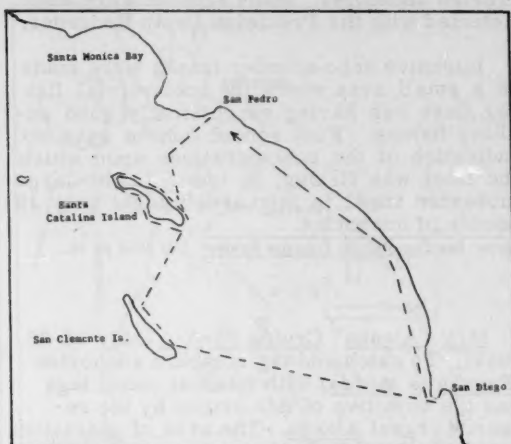
The salinity and temperature pattern was typical for the Monterey Bay area. The influence of upwelling is apparently less pronounced in the Santa Cruz Point area, and this may account for the higher temperatures around the Point and in the harbor area.

PELAGIC FISH POPULATION SURVEY CONTINUED:

M/V "Alaska" Cruise 66-A-3-Pelagic Fish (April 19-May 4, 1966): The coastal waters of southern California from Santa Catalina Island to San Diego were explored during this cruise by the research vessel Alaska, operated by the California Department of Fish and Game.

Objectives of the cruise were to: (1) evaluate midwater trawl openings using various otter door and bridle arrangements; (2) compare fishing efficiencies of a 50-foot and 28-foot midwater trawl; (3) study the effect of towing speed on midwater trawl catches; (4) experiment and gain experience fishing a lampara net for catching anchovies for tagging; and (5) develop procedures and techniques for tagging anchovies aboard the Alaska.

Mouth openings of a 50-foot square midwater trawl and a 28-foot trawl were observed with a look box. Best results were obtained using 4 hydrofoil otter doors. The large net opened between 45 and 50 feet horizontally and about 35 feet vertically. A poor vertical opening resulted when the two lower hydrofoil doors were replaced with weights. The small net opened both vertically and horizontally to an estimated 28 feet which is very close to the designed optimum.



Cruise track of M/V Alaska Cruise 66-A-3-Pelagic Fish (April 19-May 4, 1966).

A maximum towing speed of 4.0 knots was attained with each trawl. No problems were encountered although both fished at considerably shallower depths than when towed at slower speeds.

Fishing efficiencies of each size trawl were compared by towing each on alternate nights at the same location. Results indicate the large trawl catches about twice as many anchovies as the small one.

One comparison was made of anchovy catches with the small net towed at two different speeds. The regular speed of 2.80 knots was compared with 4.25 knots. The higher speed resulted in a catch 3.5 times greater than the regular, but the fish were severely damaged.

A small lampara net was set numerous times from a large skiff to gain experience for future anchovy tagging operations. Fouling of the cork and lead line necessitated modification of the net.

A total of 2,952 anchovies were tagged and released. Several major problems arose during this operation, most of which were solved at sea. Valuable experience and ideas were gained for improving future tagging operations.

Anchovies were very abundant throughout the entire area encompassed by the cruise. During flat, calm weather hundreds of breaching schools were observed in deep water between the coast and offshore islands. A dozen night-light stations were occupied, and all at-

tracted anchovies. Many schools were also detected with the Precision Depth Recorder.

Intensive echo-sounder tracks were made in a small area where the commercial fishing fleet was having exceptionally good anchovy fishing. Fish school echoes gave no indication of the concentrations upon which the fleet was fishing. A tow with the large midwater trawl in this area caught only 15 pounds of anchovies.

Note: See Commercial Fisheries Review, July 1966 p. 16.

M/V "Alaska" Cruise 66-A-4 (May 16-26, 1966): To catch and tag northern anchovies (*Engraulis mordax*) with internal metal tags was the objective of this cruise by the research vessel Alaska. The area of operations was from Cape Colnett, northern Baja California to San Diego in southern California.

The area from Ensenada to Cape Colnett was scouted and light stations were made in various localities to attract fish. Anchovies were caught by blanket net near Todos Santos Island, tagged and released at Point San Isidro. Fish schools were found in other localities, but anchovies were not caught in sufficient quantities for tagging.

Anchovies were purchased from the local live-bait operator at Ensenada, tagged on two successive days, and released in areas north of Ensenada. Fish were also purchased from a San Diego bait operator, tagged and released 8-10 miles off Point Loma and La Jolla. Wherever possible, the fish were released on another fish school attracted by light or detected with the fathometer.

Note: See Commercial Fisheries Review, March 1966 p. 19.

ABALONE OBSERVATIONS AND GROWTH STUDIES CONTINUED:

M/V "Mollusk" Cruise 66-M-1 (May 21-June 6, 1966): To determine the red abalone (*Haliotis refescens*) population by utilizing stratified random sampling techniques was the main objective of this cruise by the California Department of Fish and Game research vessel Mollusk. Other objectives were to tag red abalone at each sampling site for growth and fishing mortality estimates, and to investigate ecological relationships of red abalone. The vessel operated in the coastal area from Point Estero to Cambria.

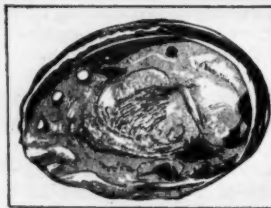
A total of 30 diving stations were selected at random, each measured 15 feet wide by 100 feet long. Station depths ranged from 22-70 feet. All recoverable abalone were collected and measured; those measuring more than 4 inches were tagged and replaced at each station.

Temperature measurements, visibility estimates, substrate characteristics and obvious living quantities were recorded at each station.

Fair to good weather was generally present during the cruise. Surface temperatures ranged from 10.5° C. (50.9° F.) to 12.0° C. (53.6° F.); bottom temperatures varied from 9.9° C. (49.8° F.) at a depth of 40 feet to 11.5° C. (52.7° F.) at a depth of 32 feet. Moderate to strong westerly winds pushed a mass of cooler water through the survey area during the latter part of the cruise.

Estimates of bottom visibility averaged about 11 feet, ranging from 6-25 feet. There was less visibility in surface waters due to heavy plankton concentrations.

A total of 355 red abalone was counted at 24 of the 30 stations. They ranged from 5.1 centimeters (2 inches) to 23.1 centimeters (a little more than 9 inches) in greatest length. There were 25 less than 4 inches; 282 ranged from 4 inches to 7 $\frac{3}{4}$ inches; and 48 were commercial legals (7 $\frac{3}{4}$ inches and greater).



Red Abalone Shell
(*Haliotis refescens*)

Of the 6 stations not producing red abalone, 1 was entirely on sand; 2 were primarily on sand but had a few small, scattered rocky outcrops; the remaining 3 were in 65- to 70-foot depths, marginal depth for red abalone in that area. However, flat abalone (*H. walallensis*) and pinto (*H. kamtschatkana*), were common to abundant at those latter 3 stations, and were frequently seen throughout the survey. Flat abalone up to 2 inches in greatest length were often collected beneath giant red urchins (*Strongylocentrotus franciscanus*).

All red abalone examined appeared to be in excellent condition. Recent shell growth

was exhibited by all specimens, measuring as much as 24 millimeters (almost 1 inch). With the exception of 3 large old-shell adults, abalone shell growth appeared quite uniform.

Stainless steel tags were fixed through the respiratory pores of 268 red abalone. Tagged abalone were replaced at the diving sites.

Exceptionally dense beds of bull kelp (*Neoreocystis luetkeana*), were developing throughout the survey area. Some of this year's sporophytes already extended to the surface from 40-foot depths, although the majority of plants were from 8 to 20 feet long.

Fish species common to most rocky bottom stations were blue rockfish (*Sebastes mystinus*), black rockfish (*S. melanops*), kelp rockfish (*S. atrovirens*), cabezon (*Scorpaenichthys marmoratus*), and kelp greenling (*Hexagrammos decagrammus*). Dominant sand bottom invertebrates were the snail (*Olivella biplicata*), and the sand dollar (*Dendraster excentricus*).

A large school of basking sharks (*Cetorhinus maximus*) was sighted off Point Estero on June 5, moving in a southerly direction.

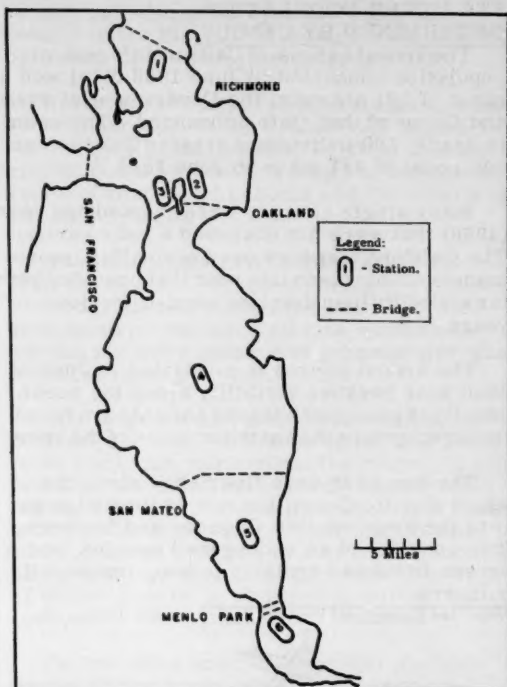
Note: See Commercial Fisheries Review, April 1965 p. 21.

SAN FRANCISCO BAY INVESTIGATIONS CONTINUED:

M/V "Nautilus" Cruise 65-N-2 (July 27-August 1, August 26-30, September 25-30, November 2-7, November 30-December 5, and December 16-21, 1965): Studies in San Francisco Bay were resumed with these cruises by the research vessel Nautilus, operated by the California Department of Fish and Game. Objectives were to collect fish and invertebrates and determine their distribution and seasonal population variations.

The six stations worked in the Bay study area had an average depth ranging from 15 to 50 feet. Station locations were: $\frac{1}{2}$ mile southeast of Redrock; $\frac{1}{4}$ mile east of middle of east side of Treasure Island; $\frac{1}{4}$ mile west of middle of west side of Treasure Island; $\frac{1}{4}$ mile west of radar pylon on San Bruno shoal; $\frac{1}{2}$ mile north of red buoy at entrance of channel to Redwood City Harbor; $\frac{1}{4}$ mile east of Dumbarton railroad bridge.

During the cruise a square-mouthed mid-water trawl 25 feet on a side was towed for



Area of operations of M/V Nautilus Cruise 65-N-2 (July-December 1965).

20 minutes at the surface. Each station was also sampled by a 20-minute bottom tow with a 15-foot otter trawl having 1-inch mesh.

As compared to 1963 and 1964, mean temperatures in 1965 were higher in the summer with a maximum of 19.7° C. (67.1° F.) in August. September and October were colder in 1965 than in 1963 and 1964. In November and December there was little difference in temperatures for the 3 years.

Salinities in 1965 generally fell between those of 1963 and 1964. Maximum for 1965 was 30.4 percent in August, and minimum was 27.3 percent in December.

A total of 72 tows yielded 122,958 fish of 53 kinds, but catches from a similar number of drags were not recorded due to gear malfunction, too many fish to hoist aboard, or replication of sampling.

Note: See Commercial Fisheries Review, October 1965 p. 24.

SEA OTTER POPULATION DETERMINED BY CENSUS:

The annual census of California's sea otter population conducted in June 1966 disclosed a count of 591 animals, the Department of Fish and Game of that state announced. The count is nearly 100 individuals greater than the census count of 497 made in June 1965.

Many single animals were counted this year (1966) that were not observed a year earlier. The California agency used a smaller, more maneuverable plane this year that provided better visibility than the plane used in previous years.

The annual census is conducted in June of each year because visibility along the ocean usually is good, and because animals are found in larger groups than at other times of the year.

The sea otter once flourished along the whole Pacific Coast, but now is limited mostly to the area between Cayucos and Monterey. It is considered an endangered species, and a census is taken regularly to keep track of its numbers.

Note: See Commercial Fisheries Review, August 1964 p. 15.



Cans--Shipments for Fishery Products, January-April 1966

A total of 705,491 base boxes of steel and aluminum was consumed to make cans shipped to fish and shellfish canning plants in Jan.-Apr.



1966, as compared with 894,564 base boxes used during the same period in 1965.

Note: Statistics cover all commercial and captive plants known to be producing metal cans. A "base box" is an area of 31,360 square inches, equivalent to 112 sheets 14" x 20" size. Tonnage figures for steel (tinplate) cans are derived by use of the factor 23.7 base boxes per short ton of steel.

Source: U.S. Department of Commerce, Bureau of the Census.



Central Pacific Fisheries Investigations

TUNA BEHAVIOR AND HEARING ABILITY STUDIES:

The first measurements of the hearing abilities of a tuna have been made at the In-

terior Department's Bureau of Commercial Fisheries Biological Laboratory, Honolulu, Hawaii, in experiments carried out over the last 3 years. Traditional methods of fishing are based on two facets of tuna behavior--they eat smaller fish and they form themselves into schools. Fishery scientists believe that closer study of other aspects of sensory capability and behavior may lead to clues that will increase the fishermen's ability to take the fish.

The fish used in the hearing experiments were yellowfin tuna (*Thunnus albacares*), which account for almost half of the United States tuna catch. They had been taken off the Hawaiian Islands and held in sea-water tanks at the Honolulu Laboratory's Kewalo Basin facility.

The experiments showed that the yellowfin tuna heard most acutely sounds between 300 and 500 cycles per second. These are relatively low-pitched sounds, in the neighborhood of the middle A on the piano. The yellowfin tuna could not hear sounds higher than about 1,100 cycles nor those lower than about 50 cycles per second.

To obtain the data, yellowfin were trained to respond to an underwater sound signal (produced by a transducer) by changing their direction of swimming. The fish were rewarded by a bit of food after each successful try. The intensity of the sound, for each frequency, was reduced until the fish made errors on half the trials. The value at that time was called their threshold of hearing.

The first measurements of the hearing ability of yellowfin tuna agreed with several such studies of other marine fish. The tuna's hearing ability is neither remarkably good nor remarkably bad by piscine standards.

What role hearing plays in the tuna's behavior is not as yet known. One possibility is that it may help them locate prey, for the sound of small fish swimming falls into the frequency range in which the tuna's hearing is most acute. Another possibility is that hearing may be used to receive signals from their own species.

It was observed that the tunas made two sounds--one is called a "snap," which "is similar to the sound made by striking a wooden pencil against a table edge." It occurred when a yellowfin shut its jaw sharply. The

other sound was named the "unh." It is "a grunt-like sound that occurred when the yellowfin flexed its body to avoid an obstacle." It was believed that the "unh" might well be used as a means of communication between yellowfin. In a school about $\frac{1}{2}$ mile across, such a signal need be relayed only 25 times to cover the distance.

The Bureau scientist who conducted the experiments presented his results at a Symposium on Marine Bio-Acoustics at the American Museum of Natural History, New York. His paper was to be published in the Proceedings of the Symposium. These studies are now being extended to other species of tuna.

Note: See Commercial Fisheries Review, July 1965 p. 20.

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OCEANOGRAPHIC RESEARCH PROJECT CONDUCTED SOUTH OF THE HAWAIIAN ISLANDS:

M/V "Townsend Cromwell" Cruise 22
(February 10-March 5, 1966): To study the wake system downstream of the Hawaiian Islands, locating the major eddies that make up this system and determining their apparent origin while studying the changes in salinity and temperature distributions in the area of the wake, was the main objective of this cruise by the research vessel Townsend Cromwell. The vessel is operated by the Bureau's Honolulu Biological Laboratory. The area of operations was south of the Hawaiian Island chain, within the area bounded by latitude 17° to 22° N., and longitude 156° to 162° W.

Other objectives of the cruise were to: (1) look for and record any association between fish schools and bird flocks and the wake system, and (2) release drift cards and bottles in the cruise area.

During the first part of the cruise, a large cyclonic (counterclockwise) eddy was found just west of the island of Hawaii, together with 3 smaller anticyclonic eddies to the south and west of Hawaii, and 1 or 2 minor, ill-defined cyclonic eddies to the northwest.

The second part of the cruise was devoted to a detailed study of the largest eddy and its smaller neighbors to the south and west. A total of 26 salinity-temperature-depth (STD) casts was made, to determine salinity and temperature within and between these eddies down to 1,000 meters (3,281 feet) and

permit calculation of dynamic topography; details of the thermal structure were studied by means of the bathythermograph (BT).

Watches were kept for bird flocks and fish schools throughout the cruise. As in previous cruises of this series, no clear-cut association could be detected between the occurrence of flocks and schools and the details of the eddy system.

A total of 1,224 drift bottles and 1,250 drift cards were released during the cruise; thermograph and barograph were operated continuously; standard marine weather observations were made; and pyranometer was operated during daylight hours.

The largest eddy, associated with a pronounced dome in the thermocline, was found to be stationary throughout the cruise; it was probably the same eddy which was detected during a January cruise by means of BT casts made in the same area. If so, its lifetime in its original position was at least 2 months and perhaps longer, since it showed no signs of either growth or dissipation during the interval.

On the other hand, the smaller cyclonic eddies to the south, which are associated with depressions in the thermocline, were found to travel westward at speeds of the order of 5 miles per day. Since these eddies occur at regular intervals--about 120 miles apart--if the system is at or near equilibrium, one such eddy must be generated upstream every 3 weeks or so.

The origin of the anticyclonic "domes" appears to be the area in the lee of the island of Hawaii; the vorticity represented by such eddies is apparently generated by currents flowing west through Alenuihaha Channel, between Hawaii and Maui. The origin of the cyclonic "troughs" is less apparent. They seem to occur too far south, and east, to be due to the sheltering effect of the island of Hawaii. It is likely that such eddies are generated in the velocity shear which occurs north of the core of the North Pacific Equatorial Current (NPEC); indeed, the eddies may mark the northern edge of that current whenever the NPEC does not intercept the Hawaiian Islands.

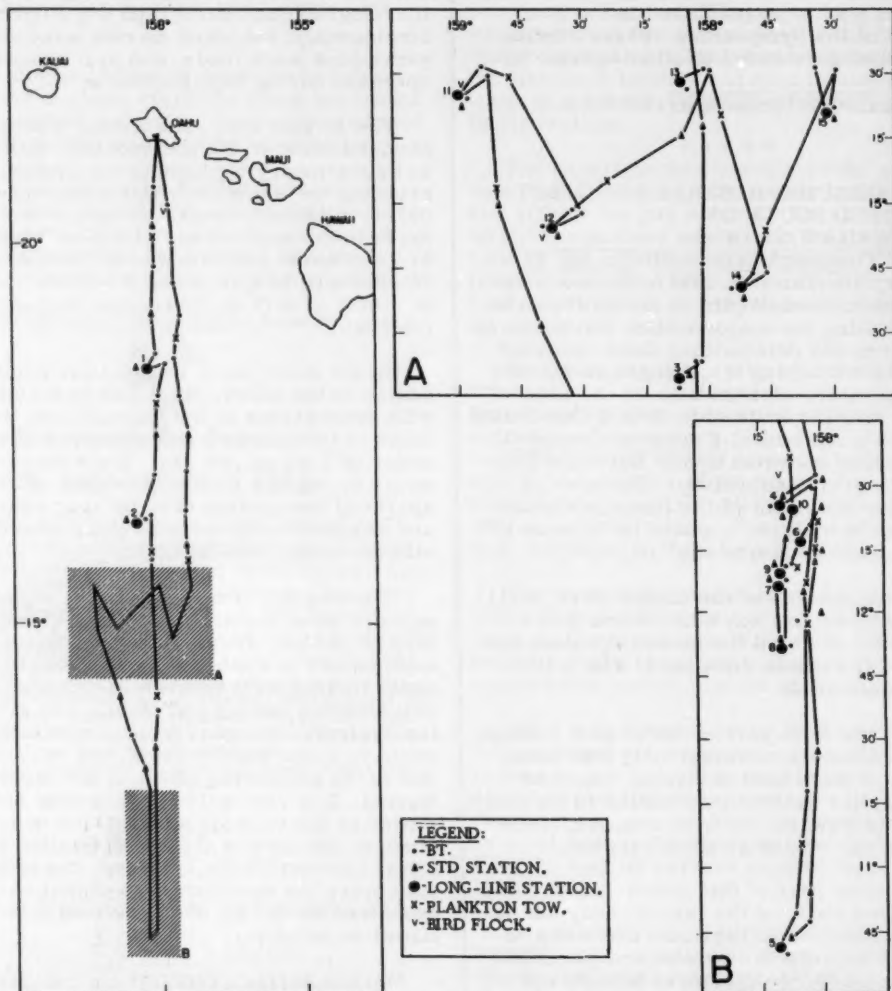
Marked surface currents (0.5-2.0 knots or more) occurred in conjunction with each of the eddies, as was evident from the drift

of the vessel. The direction of drift coincided closely with the motion which each eddy would induce, and the speed appeared directly proportional to the slope of the thermocline. This suggests that the field of motion could be determined rapidly, and with accuracy adequate for Coast Guard rescue operations, through the use of BT's alone.

M/V "Townsend Cromwell" Cruise 23
(March 14-April 1, 1966): The water structure in the area south of Oahu was studied

during this cruise by the Bureau's research vessel Townsend Cromwell. Other objectives were to: (1) study the relative abundance of apex predators in this area by means of long-line fishing and to relate it to significant oceanographic features, and (2) preserve big-eyed tuna blood samples for subpopulation studies.

An increasing number of Hawaiian long-liners are fishing in this area (between 350 to 600 miles south of Oahu), and some of the



Track chart of research vessel Townsend Cromwell Cruise 23 (March 14-April 1, 1966).

best catches of big-eyed tuna in recent years were made there.

A total of 34 STD lowerings and 55 BT lowerings were made to study the water structure in the vicinity of the cooperating Hawaiian long-liners (the Kaku, Pulpo, and Aukai) and southward to the subsurface front area. The STD lowerings made while traveling south indicated that the subsurface front was located approximately at latitude $12^{\circ}30' \text{ N.}$, longitude $158^{\circ}00' \text{ W.}$ The results showed that the long-liners were fishing about 180 miles north of the subsurface front area where transitional waters with surface salinities of 34.60-34.70 percent overlaid a tongue of North Pacific Central Water located at depths centered at about 130 meters (427 feet) with salinities of 35.05-35.06 percent.

A total of 5 long-line stations using 60 baskets of 6-hook gear were occupied along longitude $158^{\circ} 00' \text{ W.}$ while headed south to locate the subsurface front; 5 stations were made in the front area and 5 were made in the area fished by the cooperating long-liners. A total of 45 big-eyed tuna (28-205 pounds), 37 striped marlin, 2 white marlin, 11 shortnosed spearfish, 31 dolphin, 74 great blue shark, 11 thresher shark, 3 whitetip shark, 2 mako shark, 30 lancetfish, 9 sting ray, 6 wahoo, 5 skipjack tuna (14-18 pounds), and 7 yellowfin tuna (87-127 pounds) were caught. The results showed that there were more apex predators caught in the subsurface front area than were caught in the area fished by the local long-liners. Of significant abundance in the front area were the dolphin and shark. The catch of big-eyed tuna in the front area was only slightly better than that made in the area of the long-liners.

A total of 41 big-eyed tuna blood samples was collected and preserved.

Other activities of the cruise included: standard weather observations; daily thermograph records and barograph records were kept; 5 skipjack blood samples were collected and preserved; 3 sting ray were preserved for identification; 1 yellowfin tuna and 1 big-eyed tuna were chilled and 9 big-eyed and 3 yellowfin were frozen for physiological studies.

A total of 18 surface plankton tows (30 minutes each) was taken each night; incidental surface trolling was conducted when traveling between fishing stations and en route to Honolulu; weight, length, and sex of all tuna and

the weight and sex of the marlin were recorded; and the stomachs of marlin and dolphin were examined for juvenile tuna whenever possible.

Note: See Commercial Fisheries Review, June 1966 pp. 9 and 10.



Columbia River

SHAD NETTING ACTIVITIES DURING 1966 SEASON:

With the Columbia River closed to gill-netting of salmon to protect the summer chinook and sockeye runs, both the Oregon Fish Commission and the Oregon State Police received numerous calls in regard to netting activities along the river, said that State's Fisheries Director. Behind the inquiries was the fact that the shad season was open for commercial fishermen, he pointed out.

Under regulations set cooperatively with the Washington Department of Fisheries, the shad season runs from noon May 26 to noon June 25 in area 1-S (vicinity of St. Helens to near Corbett) and from noon May 26 to noon July 15 in area 2-S (near Corbett to the usual commercial fishing deadline 5 miles below Bonneville Dam). During these seasons, there is a 30-hour weekly closure each week from noon Saturday to 6:00 p.m. Sunday. The Fisheries Director emphasized that because of mesh size, strength, and design of the nets, relatively few salmon and steelhead are taken in the shad fishery. Those that are caught must, by regulation, be immediately returned to the river. The special shad season is set to allow harvest of this abundant species while at the same time protecting the salmon. Studies conducted last year showed that similar regulations satisfactorily accomplished that objective. Although some salmon were taken in the shad nets, most were alive and were returned to the river.

Shad were introduced into the Columbia River and also in the Sacramento River in California during the late 1800's. They increased rapidly and became established in various other coastal streams. Columbia River shad numbers have been high during recent years, and in 1965 a record 617,000 passed over the fish ladder at Bonneville. Many others spawned in the mainstem Columbia below the dam, especially in the Washougal Reef area.

Despite the excellent flavor of the meat, the fish has not found widespread favor locally because of its multitude of fine bones but it is popular on the East Coast. Shad roe, the clusters of tiny eggs, is the most valuable product of the shad fishery.

In past years, Columbia River shad landings have been as high as 1.4 million pounds for the season. "Shad catches have been good thus far this season. With the runs apparently on the increase and with greatly improved marketing prospects, it appears that the shad is going to occupy a position of major importance in Oregon's valuable food fish fishery," the Oregon Fisheries Director said. (Oregon Fish Commission, June 24, 1966.)



Connecticut

FEDERAL GRANT TO AID OYSTER INDUSTRY:

A \$200,000 grant to the State of Connecticut was approved in June 1966 by Secretary of the Interior Stewart L. Udall to help restore and put back into production oyster grounds in that State which were severely hit when oysters were killed by drought conditions.

Drought-caused damage reached a climax in 1965 with a total failure of oyster seed resources. Without a natural "set" of seed oysters in 1965, the Northeast faces the possibility of no marketable oysters for the 1968-69 period unless immediate steps are taken to remedy the situation.

Since the drought and the failure of oyster set were due to natural causes, the State qualifies for assistance under provisions of a Federal fishery disaster relief law passed in 1964. The law is administered by Interior's Bureau of Commercial Fisheries, and provides that the Secretary may make available up to \$400,000 to aid a fishing industry when a resource disaster occurs.

The drought disrupted large areas of oyster habitat by causing increased salinity and altering temperatures, according to Bureau scientists. The reduced fresh-water runoff also affected the food supply, protection from predators, and necessary movement of oyster larvae.

Federal assistance will be supplemented by at least \$150,000 of State funds in efforts to restore the industry which once brought oystermen and processors \$10 million annually. The Federal and State money will be used to plant spawning oysters and finance related operations.

Note: See Commercial Fisheries Review, December 1964 p. 118.



Federal Aid for Sport Fish and Wildlife Restoration

INTERIOR APPORTIONS FUNDS TO STATES FOR FY 1967:

Federal-aid funds totaling \$18,275,000 for fish and wildlife restoration projects were distributed on July 1, 1966, to the 50 states, Guam, the Virgin Islands, and the Commonwealth of Puerto Rico, announced Secretary of the Interior Stewart L. Udall.

The distribution of funds, \$3,275,000 greater than a similar distribution the previous year, was a preliminary apportionment to help states (with small reserve funds) finance Federal-aid operations between July 1 and the final apportionment for the year which comes in the fall, the Interior Secretary said.

Of the \$18,275,000 allocated, \$14,675,000 is for wildlife restoration and \$3,600,000 is for sport fishery projects.

Fish and wildlife restoration funds come from Federal excise taxes collected from manufacturers, importers, and producers of firearms, fishing rods, and other types of hunting and fishing equipment. Under the Federal aid programs, states spend their own funds on approved projects and are then reimbursed for up to 75 percent of the cost. The laws establishing those programs also provide \$10,000 each for Guam, the Virgin Islands, and the Commonwealth of Puerto Rico. The total 1967 fiscal year apportionments for those areas are included in the funds distributed on July 1.

Distribution of the funds is based on the number of paid license holders in a State and the State area. The Federal aid in Fish and Wildlife Restoration programs are administered by Interior's Bureau of Sport Fisheries and Wildlife.

Note: See Commercial Fisheries Review, August 1965 p. 34.



Federal Purchases of Fishery Products

DEPARTMENT OF DEFENSE PURCHASES, MAY 1966:

Fresh and Frozen: The Armed Forces are a major buyer of fresh and frozen fishery products. Purchases of fresh and frozen fishery products for the Armed Forces in May 1966 totaled about 2.8 million pounds with a value of \$2.1 million. This represents an important market for the U. S. fishing industry.

Canned: Tuna and sardines were the main canned fish items purchased for the Armed Forces in May 1966.

Notes: (1) Armed Forces installations generally make some local purchases not included in the data given; actual total purchases are higher than shown because data on local purchases are not obtainable.

(2) See *Commercial Fisheries Review*, July 1966 p. 23.

Source: U.S. Department of Defense, Defense Personnel Support Center, Philadelphia, Pa.



Table 1 - Principal Fresh and Frozen Fishery Products Purchased by Defense Personnel Support Center, May 1966 with Comparisons

Product	May				April				Jan. -May	
	1966		1965		1966		1965		1966	1965
	Qty. Lbs.	Avg. Cost \$/Lb.	Qty. Lbs.	Avg. Cost \$/Lb.	Qty. Lbs.	Avg. Cost \$/Lb.	Qty. Lbs.	Avg. Cost \$/Lb.	Qty. Lbs.	Qty. Lbs.
Shrimp:										
raw headless,	116,600	123	118,000	100	49,920	119	109,000	99	340,900	503,800
peeled & deveined,	251,958	163	138,700	137	201,700	161	89,500	143	667,922	547,860
breaded	406,650	108	431,650	85	217,900	110	297,600	86	1,580,917	1,659,170
molded & breaded	137,750	70	83,300	65	93,900	68	77,650	66	336,330	316,850
Total shrimp	912,958	119	771,650	94	563,420	122	573,750	95	2,926,069	3,027,680
Scallops	48,330	46	202,000	67	139,800	46	90,900	76	1,052,380	831,784
Oysters:										
Easton	48,750	134	60,160	94	38,836	130	39,120	99	249,342	306,770
Pacific	9,000	91	71,090	81	17,210	90	14,912	81	147,640	183,654
Total oysters	57,750	127	131,250	87	56,046	118	54,032	94	396,982	490,424
Fillets:										
Cod	40,350	37	37,000	29	25,300	39	32,000	34	138,800	225,270
Flounder	243,500	44	214,500	33	211,550	41	246,700	39	1,425,350	1,263,700
Ocean perch	424,320	35	377,000	28	315,975	35	362,250	30	2,049,395	1,747,540
Haddock	107,200	37	167,850	37	96,700	36	138,000	33	788,000	761,400
Haddock portions	523,047	51	195,700	43	381,540	48	177,000	44	1,729,513	870,754
Steaks:										
Halibut	95,920	57	125,560	49	110,200	57	52,800	50	506,420	500,780
Salmon	11,080	86	18,005	71	13,820	78	10,960	69	66,447	61,705
Swordfish	-	-	150	59	-	-	500	56	500	1,910

Table 2 - Fresh and Frozen Fishery Products Purchased by Defense Personnel Support Center, May 1966 with Comparisons

Quantity						Value					
May		April		Jan. -May		May		April		Jan. -May	
1966	1965	1966	1965	1966	1965	1966	1965	1966	1965	1966	1965
2,807	2,591	2,253	2,029	12,594	11,298	2,098	1,627	1,602	1,225	8,524	7,178
(1,000 Lbs.)						(\$1,000)					

Table 3 - Canned Fishery Products Purchased by Defense Personnel Support Center, May 1966 with Comparisons

Product	Quantity				Value				Jan. -May	
	May		April		May		April		1966	1965
	1966	1965	1966	1965	1966	1965	1966	1965	1966	1965
Tuna	257	1,161	-	315	1,078	3,671	468	526	954	1,609
Salmon	1	2	1	1	2,071	11	1	2	1,384	10
Sardines	200	106	13	70	445	322	87	30	245	140
(1,000 Lbs.)						(\$1,000)				

In May 1966 purchases of fresh and frozen fishery products for the Armed Forces were up 24.6 percent in quantity and 31.0 percent in value from the previous month. The increase was due mainly to much larger purchases of shrimp, ocean perch, and haddock portions.

Compared with the same month in the previous year, purchases in May 1966 were up 8.3 percent in quantity and 28.9 percent in value. Average prices were generally higher in May 1966 as compared with the same month in 1965.

Georgia

FISHERY LANDINGS AND TRENDS, 1965:

Landings of fish and shellfish at Georgia ports during 1965 totaled 20.1 million pounds valued at \$4.1 million. Compared with 1964 this was an increase of 9 percent in quantity and 39 percent in value. Production of shrimp was up 2.6 million pounds (heads-on weight) while blue crabs were down 1.3 million pounds; 94 percent of the year's total catch was made up of these two varieties of shellfish.



Fishing districts of Georgia.

Georgia's shrimp landings during 1965 amounted to 8.5 million pounds (heads-on weight) an increase of 45 percent above 1964, and 15 percent above the 5-year average (1960-1964). The average ex-vessel price per pound (heads-on weight) for shrimp during 1965 was 40 cents a pound, about 1 cent more than in the previous year. The size composition of the catch affected the overall average ex-vessel price per pound. During 1964, the 21-30 count size accounted for 33 percent of the catch, 31-40 count for 38 percent, and 41-67 count for 26 percent. This changed during 1965--the larger size (21-30) count dropped to 24 percent, medium size (31-40) count dropped to 35 percent, and the smaller size (41-67) count increased to 36 percent of the catch.

Blue crab landings totaled 10.3 million pounds--11 percent lower than in 1964. Ex-vessel prices for crabs taken by otter trawl varied from 3-6 cents a pound. Crabs taken by other types of gear, such as pots, traps, dip nets, or bait trot lines brought prices from 4-7 cents a pound.

Oyster production in 1965 totaled 247,698 pounds of meats, an increase of 26.5 percent from 1964.

Finfish landings in Georgia showed considerable improvement during 1965. The total catch of those species used for human consumption amounted to 816,000 pounds, an increase of 298,000 pounds above the 1964 catch. Of the major species of food, finfish and king whiting showed the greatest increase--253,000 pounds compared with 91,000 pounds landed the previous year. Flounder and freshwater catfish landings also increased substantially from 1964.



Great Lakes

MICHIGAN OUTLINES FISH MANAGEMENT GOALS:

Michigan's commercial fishing interests figure prominently in the State of Michigan Conservation Department's ambitious new program to develop the Great Lakes into the world's greatest fresh-water fishery. That assurance is spelled out in a policy statement recently drawn up by the Department which outlines its goals and guidelines for fish management in those waters.

In explaining the newly drafted policy, the Department's fisheries chief reported, "Our broad goal is to manage the Great Lakes for maximum development of both sport and commercial fishing. There is room for both, and there is no reason to predict at this time that one must be sacrificed for the other."

The fisheries chief noted, however, that "development of the sport fishery must be our primary management goal when there is a choice to be made." He referred to where the emphasis should be placed if conflicts arise between sport and commercial fishing interests in some parts of the Great Lakes.

While sport-fishing interests will draw first consideration to produce the greatest recreational and economic returns where conflicts occur, the Department's overall program is geared to rebuilding a "profitable and progressive commercial fishing industry," the fisheries chief stressed. He said there is good reason to believe that both kinds of fishing can be vastly expanded in the Great Lakes where "we face our greatest fisheries management challenge and our greatest opportunity."

"Introduction of predatory species such as the coho (silver) salmon, which will feed on the trash fish that now dominate the lakes, will benefit both sport and commercial interests. Although those species will be primarily for sportsmen to harvest, their predatory influence will help create conditions favorable to commercial species as well," he explained. (News Bulletin, Michigan Department of Conservation, Lansing, May 26, 1966.)

MICHIGAN PROVIDED WITH SPLAKE BROOD STOCK FOR LAKE HURON PLANTINGS:

Approximately 6,000 "super" splake fingerlings were flown to Teal Lake near Ishpeming, Mich., this past June by Canada's Ontario Department of Lands and Forests to provide brood stock for fish plantings in Lake Huron in 3 or 4 years, according to the Michigan State Department of Conservation.

The tiny fish, a highly selective strain of the lake trout and brook trout, were taken to the State of Michigan's Marquette fish hatchery where they will be raised to spawning size. Young splake reared from the future brood fish will then be planted in Lake Huron, starting in 1969 or 1970. By that time, it is expected that chemical treatment work in Lake Huron streams will have made enough progress to give the planted fish a relatively good margin of safety from sea lamprey predation. The first-round fight to control lampreys in the lake's problem tributaries was opened this spring.

The splake were specially perfected by the Canadian government agency to provide planting stock for Lake Huron which will enjoy high survival and reproduce several years earlier than lake trout.

Under a joint program to be carried out by the Ontario agency and Michigan Department of Conservation, this variety of splake will be used exclusively for restoration plantings in Lake Huron. Tentative plans call for annually stocking the lake with several million of the fish for at least 6 years.

Ontario and Michigan fisheries officials consider the splake to be much better adapted to rehabilitating Lake Huron than the lake trout which are being planted in Lakes Superior and Michigan in large numbers.

"We have been experimenting on selective strains of splake for about 10 years and this latest variety to be raised as brood stock here and in Michigan is superior to the other ones we have developed," reported the supervisor of fisheries research for the Ontario Department.

"These fourth and fifth generations of selective fish are specially adapted for deep swimming and therefore will occupy waters of Lake Huron where the lake trout formerly lived," he added. The fish have also been developed for early maturity and reach a spawning stage in 2 or 3 years. By contrast, lake trout do not mature until they are seven years old.

"This means," said the supervisor of fisheries research, "that our planting efforts will be less expensive than they would be with lake trout." Compared with lake trout, fewer separate age classes of splake will have to be planted to insure sustained reproduction of the fish, he explained.

Ontario and Michigan fisheries officials are highly optimistic that the splake planting program will be a big success. (News Bulletin, Michigan Department of Conservation, Lansing, June 2, 1966.)



Great Lakes Fisheries Explorations and Gear Development

SEASONAL DISTRIBUTION AND ABUNDANCE STUDIES OF ALEWIFE AND CHUB IN LAKE MICHIGAN CONTINUED:

M/V "Kaho" Cruise 32 (May 2-20, 1966):

To determine the distribution and measure the relative abundance of alewife and chub stocks, which provide raw material for new pet food and animal food manufacturers, was one of the objectives of this cruise by the exploratory fishing vessel Kaho. The vessel is operated by the Bureau of Commercial Fisheries, U. S. Department of the Interior.

Catches of alewife ranging from 3 tons in a 15-minute drag to 4 tons in a 1-minute drag verified the fact that this species is still on the increase in Lake Michigan and that only a small percentage of the areas yielding such catches are being used by commercial fishermen.



Fig. 1 - Alewife catch made by M/V Kaho in 15-minute drag inside Chicago Harbor.

Alewife landings increased from a few hundred pounds in 1956 to about 15 million pounds in 1965. Bureau of Commercial Fisheries investigations, closely associated with the industry during this period of growth, have furnished evidence of the great magnitude of the resource, of the almost year-around availability of alewife to otter (bottom) trawls, of the economic feasibility of producing alewife at a landed value as little as 1 cent a pound, and of the suitability of alewife for making high-quality pet food and fish meal.

Even with the 30-percent increase in alewife production expected again this year, the stocks available for harvesting will be hardly

touched. According to the present condition and distribution of Lake Michigan alewife populations, a production of 200 million pounds a year is a reasonable goal.

Continued Bureau research will maintain close surveillance of the alewife stocks, establish relationships to other important fish species, and strive to improve the economic utilization of this valuable resource.

Further evidence of the increasing numbers of alewife in Lake Michigan in spring 1966 came from such sources as municipal water supply systems, electricity generating utilities, and steel mills. Alewife plugged water intake screens more than ever this year--causing production cut-backs. One exception was the City of Chicago's Central District Filtration Plant, the largest facility of this type in the world, which experienced no difficulty even though large schools moved through the area for a period of about 5 weeks. A special deterrent net, built according to Bureau recommendations, was set around the intake area and is credited with preventing serious problems during the alewife runs.

The primary objective of the cruise was to supplement data on the seasonal availability and bathymetric distribution of alewives, chubs, yellow perch, and smelt. Secondary objectives were to collect fish for botulism studies, monitor the growth rates and distribution of newly-planted lake trout, collect depth-frequency data on chubs, alewife, and perch, and collect fish for food studies.

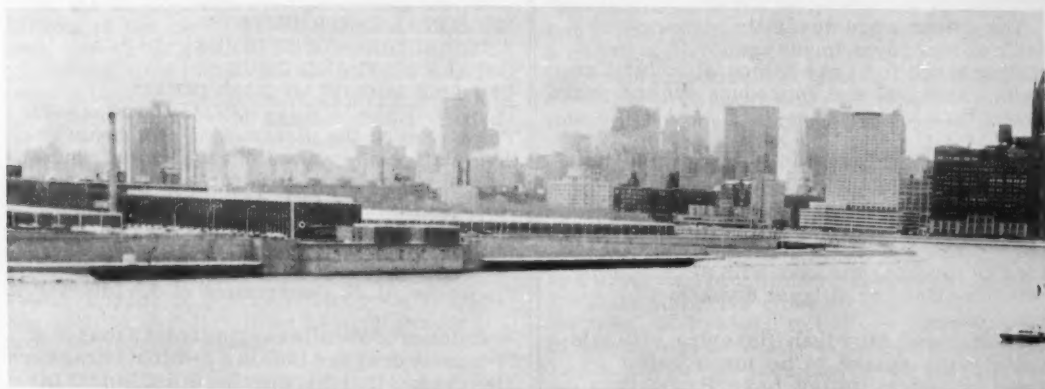


Fig. 2 - Chicago Central District Filtration Plant which supplies water to 2.5 million Chicagoans. Faint white streak near shore at left is the air bubble curtain in operation--used to prevent alewife plugging of water intake screens.

A total of 44 drags was completed with a 52-foot (headrope) fish trawl in southern and central Lake Michigan. All drags were of 30 minutes duration except 16 which were shortened due to large catches and one which snagged on a bottom obstruction. Bottom topography and fish concentrations were continuously monitored and recorded with a high resolution echo-sounder.

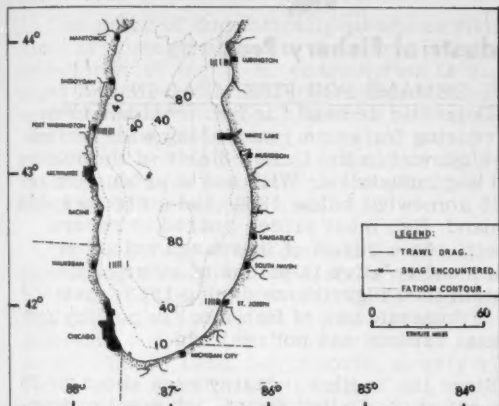


Fig. 3 - Lake Michigan explorations by R/V *Kaho* Cruise 32 (May 2-20, 1966).

Very good catches of alewife were taken in 4 of the 6 areas checked as follows: 8,000 pounds in 1 minute in the entrance piers at Port Washington; 1,800 pounds in 15 minutes at 20 fathoms off Waukegan; 6,350 pounds in 15 minutes inside Chicago Harbor; and 3,100 pounds at 5 fathoms off Benton Harbor. None of those areas are being fished by commercial fishermen. Best catches of alewife off White Lake and Ludington were only 150 and 650 pounds, respectively. Chubs were taken in significant quantities between 25 and 40 fathoms off Waukegan and Ludington only.

Fishing (bottom) temperatures during the cruise ranged from 37° to 44° F.

Notes: See *Commercial Fisheries Review*, July 1965 p. 27.



Great Lakes Fishery Investigations

BIOLOGICAL RESEARCH AND SEA LAMPREY CONTROL, MAY 1966:

Some of the highlights of Great Lakes biological research during May 1966 by the Biological Laboratory at Ann Arbor, Mich., operated by the Bureau of Commercial Fisheries:

Sea Lamprey Control: The mid-season returns of spawning-run sea lampreys at the assessment barriers on Lake Superior were most encouraging in May 1966 since a 50-percent reduction from the previous 4-year low level was becoming evident. The total catch of sea lampreys at the end of May was 2,301, compared with 5,275 lampreys a year earlier. Optimism was running high because a significant decline occurred in the Brule River where 81 sea lampreys had been taken as of that time, compared with 2,838 a year earlier. The catch from the 3 index barriers on tributaries of northern Green Bay also showed a decrease. A total of 786 sea lampreys was taken compared with 2,158 at the same time in 1965. The Ocqueoc River barrier located in northern Lake Huron captured 673 lampreys, compared with 871 a year earlier.

Chemical treatment of lamprey-producing streams progressed rapidly during May. Initial treatments were completed on the 5 remaining sea lamprey streams in Lake Michigan. They were the Galien River, Donns Creek, State Creek, Trail Creek, and Burns Ditch, all tributaries along the south shore of the lake.

Completion of the scheduled treatment of Lake Superior streams during fall 1965 has allowed the laboratory's Marquette chemical unit to gain ground on next fiscal year's schedule in Lake Huron. With the approval of the Great Lakes Fishery Commission, 9 lamprey-producing tributaries of northern Lake Huron were treated for the first time.

Lake Michigan Research: The Laboratory's research vessel *Cisco* completed a biological cruise on May 31 in southeastern Lake Michigan. One of the principal objectives of the cruise was to fish for alewife and yellow perch larvae and to collect alewives from perch spawning grounds. Collections of other species and crustaceans also were made to provide material for laboratory studies.

Yellow perch began spawning in May off Saugatuck, Mich., at the termination of the cruise. However, about half of the mature females had spawned in the vicinity of Michigan City, Ind. Examination of stomachs from alewives taken from the perch spawning grounds revealed no perch eggs.

Preliminary information from laboratory feeding experiments designed to determine food preferences of lake trout indicated an apparent dislike for alewives. Lake trout from

a hatchery source, weighing 3 to 5 pounds, quickly caught and killed adult alewives, but did not swallow them. The lake trout readily ate freshly-thawed chunks of chubs (bloaters), but refused similar pieces of alewives. Essentially the same preference for bloaters was shown when the chubs and alewives were fed in freshly ground "soft pellet" form.

Reservoir Research: Three trap nets were fished during May 1966 in the Mobridge area of South Dakota and catches were good. Some 400 fish were caught per trap day, compared with 193 in the spring of 1964 and 166 in the spring of 1965. That was an increase of 33 percent by numbers and 10 percent by weight over high catches of previous years. More catches would have been possible except high winds reduced the frequency of lifts. Catch composition and relative species abundance showed little change over previous years although crappie and burbot were more abundant. Buffalo fish of the 1962 year-class comprised about 75 percent of the total weight of fish caught. About 2,000 buffalo fish of the 1962 year-class were tagged in the Mobridge area. Biological samples were routinely collected from all species caught in trap nets.

Commercial fishermen removed 101,000 pounds of fish during May--a decrease of 10 percent below the catch made during the same period a year earlier. Fishing effort was confined primarily to the embayments of the Moreau and Grand Rivers. Thirty percent of the buffalo fish catch in numbers was of the 1962 year-class.

Lake Erie Research: The first major biological collection of sheepshead was made during May in western Lake Erie. Some 1,500 fish (1.5 tons) were taken in a single trap net lift and the total catch was processed for biological data.

The Bureau's research vessel Musky II conducted routine operations in the western basin, servicing recording thermographs and sediment collectors. The annual spring trawl sampling in East Harbor was completed to determine the state of juvenile fish populations.

Lake Superior Research: Another of the Bureau's research vessels, Siscowet, operated in the Apostle Islands area during the month determining the abundance and distribution of lake trout. A total of 911 lake trout was caught, of which 99 percent were fin-

marked fish. The abundance of lake trout was generally higher than for the same period a year earlier. The lake trout catch records of the assessment fishermen in the State of Michigan waters of Lake Superior for the month of April showed improvement over the previous year.



Industrial Fishery Products

U. S. DEMAND FOR FISH MEAL IN 1965:

Domestic demand for fish meal has been increasing for some years along with the fast development in the United States of the poultry and hog industries. With world production in 1965 somewhat below 1964, and a strong world demand, fish meal prices soared to record levels. As a result of increased prices of fish meal relative to prices of other high-protein feed ingredients during 1965, maximum domestic use of fish meal in poultry and animal rations was not realized.

Since the broiler industry uses about 70-75 percent of the United States fish meal production and imports, that industry is the best demand indicator for fish meal. During 1965, the U. S. broiler industry continued to grow largely because red meat production was down about 4 percent. As a result, red meat prices increased considerably during the year. Because of a short production period, the broiler industry was able to increase output fast in response to high prices, and was thus able to benefit by lower red meat production.

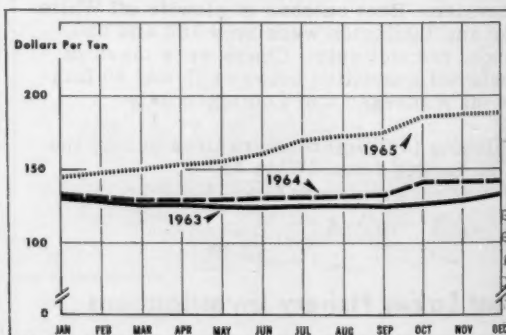


Fig. 1 - Average monthly menhaden meal prices, 1963-65.

While U. S. broiler production, and also the potential demand for fish meal increased in 1965, the utilization of fish meal did not increase because of (1) lower world supplies,

- (2) greater fish meal demand in Europe, and
(3) the resulting high price levels.

The rapidly increasing price levels of fish meal during 1965 caused greater substitution of other feed ingredients in broiler rations. Some feed producers completely eliminated fish meal in broiler rations while others decreased its use significantly.

The price of domestically-produced fish meal is closely related to the world price as two-thirds of the U. S. consumption is supplied by imports. The underlying factors which caused fish meal prices to soar to record heights in 1965 were a smaller world production and an increasing demand which resulted in keen competition for available supplies in the world market.

With a strong world demand for fish meal prevailing throughout 1965, and smaller quantities available, prices of both foreign and domestic meal rose to record levels. The domestic output of fish meal in 1965 was larger than in 1964, but imports, largely from Peru, were significantly smaller as a result of lower production in that country and high European prices.

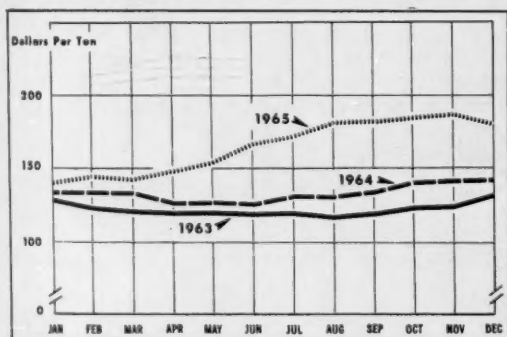


Fig. 2 - Average monthly Peruvian fish meal prices, 1963-65.

Domestic fish meal prices opened in January 1965 about \$10-\$12 a ton above a year earlier but failed to drop seasonally when the menhaden fishery started in April. Prices of both foreign and domestic fish meal rose steadily throughout the year to levels significantly above a year earlier and closed at record prices of \$180-\$186 a ton in December--about \$40-\$45 above a year earlier. (U. S. Bureau of Commercial Fisheries, Branch of Current Economic Analysis, Industrial Fishery Products Section.)

U. S. FISH MEAL, OIL, AND SOLUBLES:

Production by Areas, June 1966: Preliminary data as collected by the Bureau of Commercial Fisheries, U. S. Department of the Interior:

U.S. Production ^{1/} of Fish Meal, Oil, and Solubles, June 1966 (Preliminary) with Comparisons			
Area	Meal Short Tons	Oil 1,000 Pounds	Solubles Short Tons
June 1966:			
East & Gulf Coasts	31,414	33,966	13,938
West Coast ^{2/}	2,507	332	1,458
Total	33,921	34,298	15,396
Jan.-June 1966 Total	72,696	60,439	31,936
Jan.-June 1965 Total	98,809	77,244	35,524

^{1/}Does not include crab meal, shrimp meal, and liver oils.

^{2/}Includes American Samoa and Puerto Rico.

Production, April 1966: During April 1966, a total of 5,429,000 pounds of marine animal

Table 1 - U. S. Production of Fish Meal, Oil, and Solubles, April 1966 ^{1/}with Comparisons

Product	April		Jan.-Apr.		Total 1965
	1/1966	1965	1/1966	1965	
Fish meal and scrap: (Short Tons)					
Herring	574	236	883	1,275	12,859
Menhaden 2/	4,535	7,305	5,090	7,468	175,838
Tuna and mackerel	3,184	1,748	9,362	7,222	25,410
Unclassified	1,566	1,492	4,285	2,997	27,984
Total 3/	9,859	10,781	19,620	18,962	242,091
Fish solubles:					
Menhaden	1,559	2,147	4,213	2,147	74,405
Other	2,068	1,030	4,685	3,459	23,612
Total	3,627	3,177	8,898	5,606	98,017
. (1,000 Pounds)					
Oil, body:					
Herring	181	105	358	576	8,603
Menhaden 2/	4,529	9,603	4,660	9,698	175,368
Tuna and mackerel	431	239	1,257	1,083	4,799
Other (inc. whale)	288	205	802	504	6,864
Total oil	5,429	10,152	7,077	11,861	195,634

^{1/}Preliminary data.

^{2/}Includes a small quantity of thread herring.

^{3/}Does not include a small quantity of shellfish and marine animal meal and scrap because production data are not available monthly.

Source: U. S. Department of the Interior, Bureau of Commercial Fisheries.

Table 2-U.S. Foreign Trade in Selected Industrial Products, April 1966 ^{1/}with Comparisons

Product	April		Jan.-Apr.		Total 1965
	1/1966	1965	1/1966	1965	
Imports: (Short Tons)					
Fish meal and scrap	39,526	39,721	113,642	134,909	270,666
Fish solubles	1,439	315	1,882	2,639	5,138
. (1,000 Pounds)					
Whale oil, sperm (crude and refined)	-	58	23,266	16,303	77,105
Exports:					
Fish and fish-liver oils	103	145	16,509	11,743	103,807
Whale and sperm oil	1,900	3,079	3,370	4,357	5,928

^{1/}Preliminary data.

Source: U. S. Department of Commerce, Bureau of the Census.

oils and 9,859 tons of fish meal was produced in the United States. Compared with April 1965, this was a decrease of 4,723,000 pounds of marine animal oils and 922 tons of fish meal and scrap. Fish solubles production amounted to 3,627 tons--an increase of 450 tons as compared with April 1965.

U. S. FISH MEAL AND SOLUBLES:

Production and Imports, January-April 1966: Based on domestic production and imports, the United States available supply of fish meal for the first 4 months in 1966 amounted to 133,262 short tons--20,609 tons (or 13.4 percent) less than during the same period in 1965. Domestic production was 658 tons (or 3.5 percent) higher but imports were 21,267 tons (or 15.8 percent) lower than in January-April 1965. Peru continued to lead other countries with shipments of 71,200 tons.

U. S. Supply of Fish Meal and Solubles, January-April 1966

Item	Jan.-Apr.		Total 1965
	1966	1965	
. . . (Short Tons). . .			
Fish Meal and Scrap:			
Domestic production:			
Menhaden	5,090	7,468	175,838
Tuna and mackerel	9,362	7,222	25,410
Herring	883	1,275	12,859
Other	4,285	2,997	39,264
Total production	19,620	18,962	253,371
Imports:			
Canada	13,768	14,059	43,830
Peru	71,200	114,138	209,801
Chile	22,319	3,458	5,651
Norway	22	-	78
So. Africa Rep.	955	700	5,100
Other countries	5,378	2,554	6,206
Total imports	113,642	134,909	270,666
Available fish meal supply	133,262	153,871	524,037
Fish Solubles 1/:			
Domestic production			
	8,898	5,606	98,017
Imports:			
Canada	636	706	1,488
Iceland	33	-	-
Other countries	1,213	2,133	3,650
Total imports	1,882	2,839	5,138
Available fish solubles supply	10,780	8,445	103,155
1/ Wet weight basis except for imports from South Africa Republic (included in "other countries").			
Sources: U. S. Department of the Interior, Bureau of Commercial Fisheries, and U. S. Department of Commerce, Bureau of the Census.			

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The United States supply of fish solubles during January-April 1966 amounted to 10,780 tons--an increase of 27.6 percent as compared with the same period in 1965. Domestic production of fish solubles increased 58.7 percent and imports of fish solubles decreased 33.7 percent.



Inland Fisheries Explorations and Gear Development

OAHE RESERVOIR TRAWLING STUDIES:

Reservoir Research Vessel "Hiodon" Cruise 6 (May 1966): Another experimental trawling cruise was made in the Oahe Reservoir in South Dakota, located on the Upper Missouri River. Trawling operations by the reservoir fishery research vessel *Hiodon*, operated by the Department of the Interior's Bureau of Commercial Fisheries, were conducted in Zones 4, 5, 6, 7, 8, and 9 during May 1966.

FISHING OPERATIONS: A total of 76 drags was made with 35-, 45-, and 52-foot (headrope) trawls. The drags varied from 5 to 15 minutes duration and were made during daylight hours. Seven drags were incomplete due to fouling of the nets. No drags were attempted in Zone 5 as suitable areas were not located. One drag was attempted in Zone 7 but could not be completed. Also, an attempt to trawl in Zone 10 (Missouri River above the impounded water) was unsuccessful as it was not possible to proceed upstream beyond the Cannonball River in North Dakota.

FISHING RESULTS: The 76 drags (40 of 5-minute duration; 2 of 10-minute; and 34 of 15-minute) took a total of 6,260 fish (age group II or older) that weighed 6,404 pounds for an average of 82 fish or 84 pounds per drag. Carp (average weight 2.0 pounds) comprised 74.6 percent of the catch by weight.

Only three species comprised over 2.0 percent of the catch by weight in Zone 4. These were: carp 86.3 percent; perch 5.7 percent; and bigmouth buffalo 2.4 percent.

In Zone 6, carp and bigmouth buffalo made up 68.1 and 5.0 percent of the weight, respectively. In addition, drum made up 8.0 percent; carpsuckers 6.4 percent; goldeye 3.4 percent; and channel catfish 2.5 percent.

In the upper portion of the reservoir (Zones 8 and 9), the weight composition was: carp 51.6 percent; carpsucker 19.3 percent; shovelnose sturgeon 12.7 percent; goldeye 7.3 percent; bigmouth buffalo 2.9 percent; and sauger 2.5 percent.

A total of 419 yearling fish was taken--38 percent were white bass, 21 percent perch, and 17 percent goldeye. Also taken (in order

of decreasing abundance) were sauger, northern pike, white crappie, bullhead, walleye, black crappie, drum, channel catfish, burbot, carpsucker, and carp.

A "standard drag" had previously been of 15 minutes duration. Most of the 5- and 10-minute drags made during this cruise were in response to the strictly exploratory nature of many drags. Several small bays in lower Zone 6 and Zone 4 were tested for trawlability for the first time since the initiation of trawling on Oahe Reservoir. Some of these bays are not sufficiently long to accommodate 15-minute (approximately one mile) drags. In the fall of 1965, drags made on shallow flats were more productive than drags made in bays. During this cruise, however, the average bay drag took 151 pounds as compared to 41 pounds per drag on flats in the reservoir proper. This revised differential in rate of catch is probably associated with the warmer water temperatures in bays and behavior characteristics of the various species in response to this environmental condition. As a result, the 5-minute drags, many of which were made in bays, were about as productive (84 pounds per drag) as the 15-minute drags (89 pounds per drag), most of which were made over flats in the open reservoir. Eight drags in the old river channel took only 31 pounds per drag.

Trawl comparison tests had been scheduled for this cruise. The poor catches during May, however, made it advisable to postpone these experiments until catches improve. The trawling grounds exploration activity was substituted for the trawl comparison tests.

Note: See Commercial Fisheries Review, February 1966 p. 22.



Maine Sardines

QUALITY CONTROL PROGRAM FOUND EFFECTIVE:

The effectiveness of their mandatory quality control program was clearly demonstrated to Maine sardine canners at their annual spring meeting held June 9, 1966, in Ellsworth, Me. On display at the meeting were 130 open cans of various brands and types which were purchased in retail stores in 16 key markets on a national basis.

The Maine Sardine Packers Association president stated it was the consensus of those present that the overall quality and appear-

ance were by far the best of any similar cutting in the past 15 years. "This certainly proved that our quality control program is working and was a great source of satisfaction for all concerned," he said.

Forty-two canners and their representatives attended the session and were briefed on congressional affairs, plant improvement and mechanization, the consumer market situation, and publicity and promotion. Also given was a briefing on Canadian government and industry plans to increase the herring fishery. (Maine Sardine Council, Augusta, Maine, June 9, 1966.)



National Fisheries Institute

ADVERTISING AND MERCHANDISING MANAGERS' CONTEST IS FEATURE OF 1966 "FISH 'N SEAFOOD PARADE":

The first contest of its kind sponsored by the United States fishing industry for advertising and merchandising managers of supermarkets (chains and independents) will be a feature of the 12th annual Fish 'n Seafood Parade during October 1966. An impressive array of prizes is to be given.

The fall Parade is aimed at increasing the sale of fishery products at a time when they are most plentiful, according to the chairman of the Fish 'n Seafoods Promotions Committee of the National Fisheries Institute (NFI).

Winners of the contest will be selected on the basis of the most effective and creative newspaper advertising of fish and seafood during October. Prizes will include a 1967 Ford Mustang, a two-week holiday in Europe, RCA color TV sets, portable TV sets and typewriters, record players, luggage, watches, major electric appliances, Instamatic cameras.

To make store advertising and merchandising managers throughout the United States aware of the Fish 'n Seafood Parade Promotion and the contest, a promotional brochure featuring the advertising themes of the fall Parade is being distributed.

Contest details and coordination of the program will be handled by the New York office of the J. Walter Thompson Co., the advertising agency for the National Fisheries Insti-

tute. Judges of the contest will be selected from the food trade.

To inform buyers of food eaten away from home of the goodness and abundance of fishery products, advertising will be directed to the mass-feeding market. A full-scale publicity campaign to acquaint all buyers of food with the benefits of serving fish and seafoods will be channeled through national and quantity-feeding magazines, newspapers, radio and TV programs.

Area Fish 'n Seafood Parade committees are being formed. The committees of industry men will plan local publicity and advertising promotions to tie-in with the national campaign.

Note: Information about the trade contest and the national and local promotions may be obtained from the National Fisheries Institute, 1614 Twentieth St. NW., Washington, D. C. 20009.



Nautical Charts

NEW TIDAL CURRENT TABLES ISSUED FOR LONG ISLAND AND BLOCK ISLAND SOUNDS:

The publication of new tidal current tables of Block Island and Fishers Island Sounds and northeastern Long Island Sound, based on the most extensive survey in 36 years of the New York-Connecticut-Rhode Island area, was announced June 13, 1966, by the U. S. Department of Commerce.



Long Island and Block Island Sounds area covered by new tidal current tables shown in heavy black lines.

The new tables will provide the more than 450,000 recreational boaters, fishermen, commercial shippers, and engineers who frequent the area with the most up-to-date information available on the current behavior of this heavily-traveled waterway.

The new tables were incorporated in a pamphlet issued as a supplement to the 1966 Tidal Current Tables for the Atlantic Coast of North America, which were published in October 1965. Information in the supplement will subsequently be included in the 1967 Tidal Current Tables.

The supplement to the annual publication was published by the Coast and Geodetic Survey, an agency of the Environmental Science Services Administration (ESSA). It was issued in order to make the new data available in time for summer use by recreational and other boaters.

The supplement covers all of Block Island Sound, most of Fishers Island Sound, the northeastern section of Long Island Sound between Orient Point on Long Island and the southern Connecticut shore, and part of the Thames and Mystic Rivers in Connecticut. It was based on last year's survey, part of a 3-year project of the Coast and Geodetic Survey which will be completed in 1967. The entire survey will embrace the waters of Long Island Sound, Block Island Sound, Fishers Island Sound, and part of the Housatonic, Connecticut, Thames and Mystic Rivers.

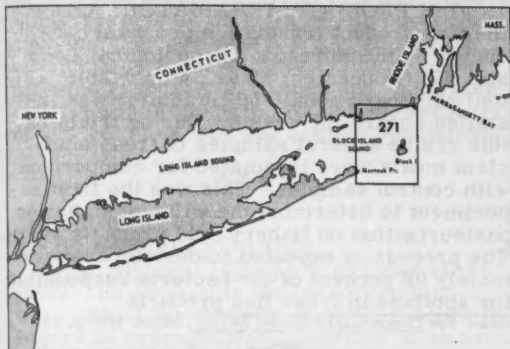
Free copies of the pamphlet can be obtained from the Survey's local sales agent or by writing to the Coast and Geodetic Survey at 602 Federal Office Bldg., 90 Church St., New York, N. Y. 10007, or at the Washington Science Center, Rockville, Md. 20852.

* * * * *

NEW CHART ISSUED FOR BLOCK ISLAND SOUND:

A new nautical chart covering a portion of one of the nation's busiest waterways--Block Island Sound and the east entrance to Long Island Sound--has been issued by the Coast and Geodetic Survey, an agency of the U. S. Department of Commerce's Environmental Science Services Administration (ESSA).

The large-scale chart (No. 271, scale of 1:40,000) will provide greater detail for the safe navigation of the area, which handles a heavy concentration of commercial and recreational boating, much of it to and from New York City. The chart will also be of great help to the more than 500,000 recreational craft from New York, Connecticut, Rhode Island, and Massachusetts, which frequent the area.



Nautical chart covering the Block Island Sound and east entrance to Long Island Sound (area indicated by the box).

A considerable portion of the approximately 150 million tons of waterborne commerce to the Port of New York passes through Long Island Sound and thence through the East River.

The new chart will be welcomed by fishermen of the area from Montauk Point to Block Island Sound, reputedly the best fishing locality between New Jersey and Massachusetts. A considerable amount of the 686 million pounds of fish and shellfish landed at New York, Connecticut, Rhode Island, and Massachusetts in 1965 was taken from that area.

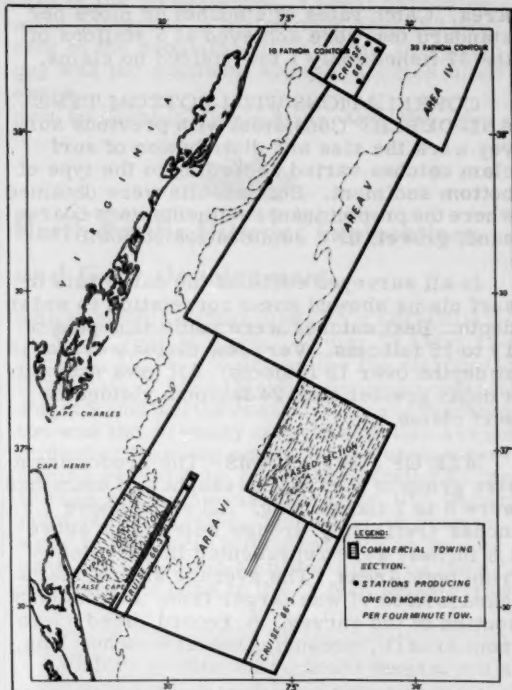


North Atlantic Fisheries Explorations and Gear Development

SURF CLAM SURVEY CONTINUED:

M/V "Delaware" Cruise 66-3 (April 29-May 13, 1966): Catches of surf clams (*Spisula solidissima*) by hydraulic jet dredge varied from none to 3.6 bushels per 4-minute (standard) tow, and from none to 3.8 bushels per 20-minute (simulated commercial) tow during a recent survey of the surf clam population off the Virginia, Maryland, and Delaware coasts. The exploratory fishing vessel Delaware, operated by the Bureau of Commercial Fisheries, U. S. Department of the Interior, completed a preliminary survey in the area off Virginia (Area VI) and continued earlier work off Maryland and Delaware (Area IV).

SURVEY PROCEDURES: The procedure used during previous surf-clam surveys was



Shows surf clam Areas IV, V, and VI and producing stations during M/V Delaware Cruise 66-3 (April 29-May 13, 1966).

followed during this cruise. Stations were located at 1-mile intervals along 1-mile spaced grid lines. A 48-inch hydraulic jet dredge was towed 4 minutes at each site with the exception of 64 commercial simulated tows for 20 minutes each in a preselected section of Area VI.

RESULTS IN AREA VI: Only 2 standard tows, located in the inshore section surveyed in Area VI, yielded catches of one bushel or more. Out of 221 standard tows completed in the Area, 89 yielded less than one bushel and 130 were unproductive. In the offshore section of Area VI only a few clams were taken at shallow water stations. Simulated commercial tows for 20 minutes were made at 64 stations in one section of Area VI; none of these yielded 4 or more bushels. Except for 2 sections (restricted navigation and reported unexploded mines), standard survey coverage was completed in Area VI.

RESULTS IN AREA IV: Surf-clam catches in the section surveyed in Area IV were better than expected, based on previous work in the

Area. Catch rates of 1 bushel or more per standard tow were achieved at 5 stations of the 37 fished; only 1 tow yielded no clams.

CORRELATIONS WITH BOTTOM TYPE AND DEPTH: Consistent with previous survey work the size and distribution of surf clam catches varied according to the type of bottom sediment. Best results were obtained where the predominant sediments were coarse sand, gravel, or a combination of both.

In all surveyed sections the catch rate of surf clams showed some correlation to water depth. Best catches were made at depths of 13 to 15 fathoms. Very few clams were taken at depths over 15 fathoms. All tows made at a depth greater than 24 fathoms yielded no surf clams.

SIZE OF SURF CLAMS: The predominant size group of surf clams caught and examined were 5 to 7 inches long. All sizes above 1.5 inches (reflecting dredge selectivity above 1.5 inches) were represented in the catches from both Areas. The average size of clams taken in Area VI was larger from the offshore section of the survey. A record sized clam from Area IV, measuring nearly 8 inches long, is the largest taken by the survey to date.

OCEAN QUAHOGS: Catches of ocean quahogs were very small and widely scattered in both Areas. The largest catch (30 quahogs) was made in the deeper offshore waters of Area VI.

UNDERWATER TV AND CLAM-SOUNDER WORK: The fishing operation of the dredge and views of the bottom were observed using a closed-circuit underwater TV system. Because of good water transparency, the action of the dredge knife, jet header and other component parts were seen clearly. Live surf clams in the bottom were not seen but other species of shellfish and fish were visible. Considerable movie film footage was obtained by photographing the shipboard TV monitor.

Trials were successfully accomplished with a redesigned clam-sounding system. Sounds transmitted by the sounder, while towing on bottom, were tape recorded as the device was viewed through the underwater TV system. Although no identifiable sound of a live clam was recorded other sounds relating to the dredging operation were recorded and identified.

FISH PRODUCTS IRRADIATOR: Under the fish product irradiation program conducted by the Bureau's Technological Laboratory at Gloucester, Mass., a "portable" (17-ton) shipboard cobalt-60 irradiator was installed aboard the vessel. During trials on this cruise several samples of fresh surf-clam meats were irradiated for comparison with control samples. This was the first experiment to determine the value of radiation pasteurization on fishery food products at sea. The process is expected to destroy approximately 99 percent of the bacteria responsible for spoilage in fresh fish products.

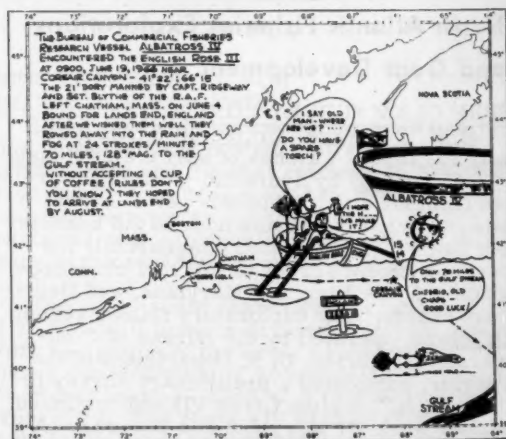
Note: See Commercial Fisheries Review, March 1966 p. 28.



North Atlantic Fisheries Investigations

RESEARCH VESSEL "ALBATROSS IV" SETS RECORD FOR DAYS AT SEA:

The research vessel Albatross IV, operated by the Interior Department's Bureau of Commercial Fisheries, set a new record during the period July 1965 to June 1966. In all, 14 research cruises were carried out, totaling 232 days at sea. The bulk of the research was concerned with the distribution and abundance of groundfish in the Gulf of Maine and neighboring waters to the north (Scotian Shelf) and south (southern New England). The three cruises in early spring, summer, and fall, lasted 91 days overall.



Oceanographic surveys in the same area (4 cruises totaling 59 days) monitored the dy-

namics and secular changes in water masses. Three cruises by other Bureau laboratories, studying herring, lobsters, and acoustical problems occupied 44 days. Other cruises included research on the benthos, midwater distribution of juvenile groundfish, serology of groundfishes, and sea scallop populations.

DISTRIBUTION OF ZOOPLANKTON STUDIED:

M/V "Rorqual" Cruise 4-66 (May 17-26, 1966): To determine the inshore-offshore and vertical distribution of zooplankton with regard to hydrographic conditions in an area extending from Cape Ann to Machias Bay, Me., was the objective of this cruise by the research vessel Rorqual, operated by Interior's Bureau of Commercial Fisheries.

BIOLOGICAL OBSERVATIONS: Plankton tows lasting 15 minutes each using Clarke-Bumpus closing samplers in a vertical series 0, 10, 30, and 60 meters (0, 32.8, 98.4 and 196.8 feet), were made along 6 transects from inshore to the 100-meter (328 feet) isobath. Oblique tows from 0 to 20 meters (0 to 65.6 feet) and lasting 30 minutes each were taken using a Gulf III sampler at 8 coastal continuity stations and at 4 additional locations. Exploratory Clarke-Bumpus tows were made in Pleasant Bay and the Machias, Sheepscot, and Piscataqua Rivers.

HYDROGRAPHIC OPERATIONS: At each station: (1) a Nansen bottle cast was made to determine salinity at 0, 10, 20, and 30 meters and the bottom; (2) a bathythermograph (BT) cast was made to determine vertical temperature distribution; (3) water transparency was measured with a Secchi disc; and (4) meteorological observations were recorded. Five sea-bed drifters and 5 surface drift bottles were released at each station.

PRELIMINARY FINDINGS: The average concentration of zooplankton along the coast was not significantly different ($P > .05$) from the average station value obtained in spring 1965. However, the center of zooplankton abundance shifted from the western Gulf coast in 1965 to the central area this year. The average volume in the western area was 4 times lower than in 1965. As in previous years, the lowest areal volumes occurred in the eastern sector.

Copepods were the dominant zooplankters in the western and central Gulf coast (70 per-

cent of the zooplankton). Larval barnacles were numerous in the eastern area (82 percent of the zooplankton). Calanus finmarchicus was the dominant copepod species in all areas.

Note: See Commercial Fisheries Review, April 1966 p. 29.



North Pacific Fisheries Explorations and Gear Development

HAKE POPULATION SURVEY CONTINUED:

M/V "John N. Cobb," Cruise 78 (May 13-June 10, 1966): To determine the distribution of schools of hake (Merluccius productus) in Puget Sound and the coastal waters of Washington was the primary objective of this 4-week midwater trawling cruise by the exploratory fishing vessel John N. Cobb, operated by the Bureau of Commercial Fisheries, U.S. Department of the Interior. Secondary objectives were to (1) obtain biological data on Pacific hake and (2) obtain additional data on the availability of hake to the "Cobb" pelagic trawl.



Bureau of Commercial Fisheries exploratory fishing vessel M/V John N. Cobb.

Echo-sounding transects were made to locate concentrations of hake and their availability was measured with the "Cobb" pelagic trawl. These transects were made throughout Puget Sound and in the coastal waters of Washington between 25 and 100 fathoms.

PUGET SOUND: Hake concentrations were located in Saratoga Passage, Port Susan to Port Gardner, Possession Sound, and Hood Canal. In Saratoga Passage the fish signs were sporadic and light and were mainly found along the western side of the Passage close to shore. Hake signs in Port Susan were more concentrated than those in Saratoga Passage and were found as far north as Kayak Point

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PUGET SOUND: Hake concentrations were located in Saratoga Passage, Port Susan to Port Gardner, Possession Sound, and Hood Canal. In Saratoga Passage the fish signs were sporadic and light and were mainly found along the western side of the Passage close to shore. Hake signs in Port Susan were more concentrated than those in Saratoga Passage and were found as far north as Kayak Point

in Port Susan to as far south as Port Gardner near Everett.

The best signs were found in Port Susan off the eastern shore of Camano Island in about 8 to 12 fathoms of water above the bottom depths of 58 to 64 fathoms. The fish signs were not considered heavy. At the time of the survey, the commercial trawler St. Janet was fishing these hake concentrations off the eastern tip of Camano Island and catching on the average about 6,600 pounds an hour. The John N. Cobb's average catch was about 8,300 pounds an hour in the same locality. This was based on 3 tows. The southern end of the Port Susan school was fished off Port Gardner where 3,000 pounds of hake an hour were caught.

Sporadic signs were encountered between Hood Canal and Port Gardner. A 20-minute tow, made on one of these signs off Possession Point, caught only 100 pounds of hake and 100 pounds of pollock.

Hake concentrations were found in Hood Canal off the eastern and southern shores of Toandos Peninsula and as far south as Tekiu Point. The echo returns from those fish were light to medium. The fish were from 10 to 20 fathoms off the bottom and the catch rate on them was 6,000 pounds an hour.

Dogfish (Squalus acanthias) was the only species of fish taken in any appreciable quantities with hake. In Port Susan about 2 to 15 percent of the catches consisted of dogfish. They were large fish (2 to 3 feet in total length) and of 52 fish examined, 25 had the remains of Pacific hake in their stomachs. In Hood Canal about 100 pounds of small dogfish (26 to 31 centimeters or 10.2 to 12.2 inches in total length) were caught with the 6,000 pounds of hake.

COASTAL WATERS OFF WASHINGTON: During the first two-thirds of the cruise off the coast of Washington (May 27 to June 5), fish signs were numerous but mostly sporadic from Destruction Island to the Columbia River. The only sizable and dense concentration of fish was found in the vicinity of the Russian fleet which was operating southwest of Willapa Bay. That school extended from off Klipsan Beach southward to Long Beach (a distance of about 7 to 8 miles) and was on the average about 2 miles wider. It was situated over bottom depths from 32 to 48 fathoms. The signs were 2 to 4 fathoms in thick-

ness and were on or about 1 fathom off the bottom. The best signs were about 5 miles in length and 1 to 1½ miles wide over bottom depths from 38 to 46 fathoms. This school was located and sounded on May 29.

A second and more northerly school was located northwest of Grays Harbor on June 3. Latitudinally the school extended from off the Queets River south to off Moclips, a distance of some 15 miles. The school was about 4 miles wide at its greatest width and was situated over bottom depths from 43 to 60 fathoms. The best signs were over bottom depths of 50 to 53 fathoms. However, the signs were mostly light and sporadic indicating that the fish were not formed into a compact school. Fishing this school yielded only 1,000 to 4,000 pounds of fish an hour.

During the latter third of the cruise off the Washington coast, hake signs were more numerous and in certain localities more dense than was observed earlier in the cruise. The school located off Klipsan Beach near Willapa Bay earlier in the cruise showed a much denser trace and when fished yielded from 8,000 to 12,000 pounds of hake an hour. Good hake signs were observed northwest of Cape Shoalwater but a one-hour tow on these signs caught only 6,500 pounds of hake. On the evening of June 8, a small but dense pocket of fish was located directly off the entrance to Grays Harbor over a bottom depth of 43 fathoms. These signs yielded 12,000 pounds of hake an hour. The school to the north between Moclips and the Queets River also showed an increase in the density of the signs, when a number of sounding transects were made through it on June 9. A Soviet side trawler, which was fishing in the vicinity of these dense signs, was observed bringing aboard a catch of some 20,000 pounds of hake.

BIOLOGICAL OBSERVATIONS: Samples of Pacific hake taken in Puget Sound were smaller than those taken off the coast of Washington. Puget Sound hake ranged in size from 15 to 66 centimeters (5.9 to 26.0 inches) with a mode of about 35 centimeters (13.8 inches) whereas the coastal hake ranged in size from 38 to 70 centimeters (15.0 to 27.6 inches) with a mode of about 50 centimeters (19.7 inches).

A marked difference was found in the sex ratio between hake taken in Port Susan and those taken in Port Gardner and Hood Canal. In two of the hauls made in Port Susan the

sex ratios were 8 to 1 and 13 to 1 with males predominating. By contrast, those fish taken in Port Gardner and Hood Canal had a sex ratio of nearly 1 to 1.

The stomach contents of hake caught off the coast of Washington contained principally euphausiids and occasionally anchovies.

In Puget Sound a strong continuous echo return from near surface water (5 to 15 fathoms) was encountered off Seattle and as far south as Case Inlet and Carr Inlet. A half-hour tow with the pelagic tow was made on those signs, but no organisms were taken. Subsequently, plankton tows made through these signs caught many ctenophores, which may explain the strong echo returns.

COOPERATIVE STUDIES: In cooperation with the Bureau's Seattle Technological Laboratory, a lot of Pacific hake was delivered to a reduction plant in Puget Sound for oil yield tests. Also, about 600 pounds of hake were iced at sea for delivery to the Seattle Technological Laboratory. The iced fish were to be used for quality tests to determine their use in fish blocks.

Note: See *Commercial Fisheries Review*, July 1966 p. 38.



Oceanography

STUDENT WORK-STUDY PROGRAM OF U. S. NAVAL OCEANOGRAPHIC OFFICE:

Fifty college students from across the Nation participated this summer (1966) in a work-study program of the U. S. Naval Oceanographic Office, Suitland, Md. On-the-job training takes place during collegiate vacations in support of formal studies conducted during the past scholastic year.

Students enter the summer training program at a grade level based on their previous academic progress. After successfully completing each period of on-the-job training, the students are granted leave to return to college. No salary is paid for the time a trainee is in college and each must defray expenses involved in their formal education. On completion of both on-the-job training and college education, a student is then eligible to join the Naval Oceanographic Office as a regular employee.

The program is geared toward assisting ambitious college students interested in oce-

anography to utilize their talents and training toward a challenging career. Young people studying oceanography, mathematics, chemistry, cartography, physics and engineering are given competitive examinations and those at the top are selected for the summer program.



Oregon

CHINOOK FINGERLING LIBERATION TIED IN WITH BONNEVILLE HATCHERY EXHIBIT:

Release into the Columbia River from the Oregon Fish Commission's Bonneville Hatchery of 5.5 million fall chinook fingerlings was scheduled for June 28, 1966, announced that State's Fisheries Director. The young fish, measuring $3\frac{1}{2}$ inches long, were reared at the hatchery for about 120 days. The liberation coincided with the opening of the Commission's new public exhibit at the Bonneville station. The exhibit incorporated the idea of the self-guided tour so popular in various parks and other places of historic or scenic appeal.

The Oregon Fish Commission plays host to about $\frac{1}{2}$ million visitors at Bonneville Hatchery each year. Although hatchery personnel may occasionally be available to answer questions by visitors, the Commission has felt the need for a good interpretive display that would give detailed information on hatchery operations as well as other phases of its activities without the visitor having to look up someone to answer his questions.

The new public display included 7 major points of interest located at different places throughout the hatchery grounds. Since a visitor to this or any other hatchery cannot hope to see at any particular time of the year all of the seasonal activities that are connected with modern fish culture, the Bonneville display attempts to fill the gap by explaining what activities take place at each particular locale, when it takes place, and its role in the overall activity of the hatchery.

"We look at the opening of the Bonneville self-guided tour as the unveiling of an important new recreational and educational attraction," the Fisheries Director said. Modern concepts of color and form have been used freely to give even wider appeal to an interesting and important conservation story.

Although the new display will add greatly to the visitor's enjoyment of a trip to Bonneville Hatchery, the facility still remains essentially an important salmon production station rather than merely a recreational tour attraction, it was emphasized. Bonneville Hatchery is one of 15 operated by the Oregon Fish Commission in the Columbia River system and on various coastal streams.

The Bonneville station is financed in part by the Federal Government under terms of the Columbia River Fishery Development Program and is to provide, at least in part, mitigation for damage to the Columbia River runs by construction of dams in the river system.

About 5.5 million fall chinook and 1.5 million young coho salmon are liberated each season into the Columbia River at the hatchery. Returns of adult fish to the station have been increasing each year and tagging studies have shown Bonneville fish make a substantial contribution to both sport and commercial fisheries offshore as well as in the Columbia River.

Adults from the 5.5 million fall chinook which were released in June will return to the hatchery stream on their spawning run mainly as 3- and 4-year old fish with a scattering of 5-year olds and some 2-year old jacks. "We now have at the Bonneville Hatchery a display which we feel will make a tour of the facility an enjoyable and worthwhile experience," the Fisheries Director said. "The grounds are open every day and we encourage everyone who is interested in Northwest fish and conservation to plan to visit the Bonneville Hatchery in the near future." (Oregon Fish Commission, June 24, 1966.)

SALMON SPAWNING AREAS OPENED BY REMOVAL OF DAM:

Removal of Dee Dam on the East Fork of Hood River has made at least 40 miles of spawning and rearing area on both the East and Middle Forks readily available to salmon and steelhead, the Oregon Fish Commission reported. Prior to a complete block to upstream passage caused by the flood in 1964, there had been some use of upstream spawning areas by anadromous fish, mainly steelhead, but passage over the inadequate fishway at Dee Dam had been of concern to the fishery management agencies for many years.

Dam construction, water diversions, industrial developments and other demands have continually reduced the Columbia River system's available spawning and rearing areas over the years. For this reason, opening the East and Middle Forks of Hood River to ready access by anadromous fish is especially significant.

Although both coho and chinook salmon as well as steelhead have utilized the spawning and rearing areas on the East and Middle Forks, the runs of those species were termed remnant by the project leader of the Commission's Columbia River watershed development program. One of the main reasons for the reduced salmonid runs is the long-term inadequate passage at Dee Dam.

The Hood River system, typical of those of glacial origin, is subject to periods of high runoff and resultant scouring of the streambed. Despite this situation, the East and Middle Forks have a considerable quantity of good spawning and rearing area for anadromous fish. Experimental releases of marked coho fingerlings have resulted in encouraging returns of adult fish. Additional emphasis will now be given to building up the coho runs in that portion of the drainage. It is planned to supplement natural production of anadromous salmonids with releases of hatchery stock, the Commission stated.

Although it will take some time to determine the contribution of the East and Middle Forks in helping to maintain and increase the salmon and steelhead runs of the Columbia River, removal of Dee Dam is a big step in the right direction. (Oregon Fish Commission, June 9, 1966.)



Pacific Marine Fisheries Commission

ANNUAL SPRING MEETING FOR 1966 HELD:

The Executive Committee of the Pacific Marine Fisheries Commission (PMFC) held its annual spring meeting in Portland, Oreg., on June 21, 1966.

Alarm at the continuing presence and increasing number of Soviet fishing vessels off Oregon and Washington was expressed by the director of the California Department of Fish and Game. The presence of the Soviet

fleet and its unknown catch destroys the usefulness of PMFC's data series upon which the member PMFC agencies depend for information regarding the abundance of bottom-fish. Soviet cooperation in supplying catch statistics and similar biological information and in observing local conservation practices is necessary if the fishery resources are to be managed wisely.

The directors of the Oregon Fish Commission and Washington Department of Fisheries stated that PMFC's announcement on June 9, 1966, of a proposed 7-point policy and program regarding foreign fishing had been helpful to the respective Governor's Committees on Foreign Fishing of which they are members. At a joint meeting of the two committees in June, an 8-point program embracing many of PMFC's provisions was recommended to the Governors of Oregon and Washington. The directors of the Oregon Game Commission and Idaho Department of Fish and Game joined in urging that PMFC's 7-point program be implemented as quickly as possible.

During the discussion of salmon problems, concern was expressed about upsetting the ecology of salmon and steelhead as the result of increased water temperatures resulting from dams and other projects on rivers. The executive director of PMFC was instructed to prepare a proposed resolution urging that high dams on all rivers be designed and operated to provide releases of cold water for the maintenance of salmon and steelhead and other valuable fish. It was urged that studies be expedited of means for accomplishing this at such projects as the Canadian storage dams on the Columbia and High Mountain Sheep Dam on the Snake River. If the cooling potential of those dams is not utilized, the dams will cause increases in water temperatures in addition to those predicted from the Hanford atomic electric plant and those increases already caused by existing dams.

Arrangements were approved for the Pacific Marine Fisheries Commission's annual meeting to be held in Seattle on November 17 and 18, 1966.



Salmon

U. S. PACIFIC COAST

CANNED STOCKS, JUNE 1, 1966:

On June 1, 1966, canners' stocks (sold and unsold) in the United States of Pacific canned salmon totaled 915,886 standard cases (48 1-lb. cans)--125,827 cases less than on May 1, 1966, and 35,758 cases less than on June 1, 1965, when stocks totaled 951,644 standard cases.

On the basis of total stocks of 1,263,744 actual cases (consisting of cans of 1/4-lb., 1/2-lb., 1-lb., etc.), red salmon accounted for 979,602 cases (mostly 1-lb. and 1/2-lb. cans) or 77.5 percent of the total canners' stocks on June 1, 1966; pink salmon accounted for 139,207 cases or only 11.0 percent (68,684 cases were 1-lb. talls and 66,702 cases were 1/2-lb. cans). Next came coho or silver (54,230 cases), followed by king (47,854 cases), and chum salmon (42,851 cases).

Carryover stocks at the canners' level totaled 733,575 standard cases on July 1, 1965, the approximate opening date of the

Table 1 - Total Canners' Stocks of Pacific Canned Salmon, June 1, 1966

Species	June 1, 1966	May 1, 1966	Apr. 1, 1966
	(No. of Actual Cases)		
King	47,854	42,298	58,239
Red	979,602	1,037,435	1,112,151
Coho	54,230	73,153	102,039
Pink	139,207	203,619	255,864
Chum	42,851	68,120	92,726
Total . .	1,263,744	1,424,625	1,621,019

Table 2 - Canners' Stocks on Hand June 1, 1966 (Sold and Unsold), by Species and Can Size

	King	Red	Coho	Pink	Chum	Total
	(Actual Cases)					
48-1/4 lb.	5,312	111,750	23,634	1,276	26	141,998
48-1/2 lb.	40,814	341,769	20,601	66,702	12,833	482,719
48-1 lb.	1,727	524,256	7,694	68,684	28,423	630,784
12-4 lb.	1	1,827	2,301	2,545	1,569	8,243
Total	47,854	979,602	54,230	139,207	42,851	1,263,744

Table 3 - Cannery Shipments from July 1, 1965, to June 1, 1966, by Species and Can Size

	King	Red	Coho	Pink	Chum	Total
	(Actual Cases)					
48-1 lb.	8,888	313,298	101,204	7,217	41	430,648
48-2 lb.	128,038	641,246	111,947	345,638	81,259	1,308,128
48-1 lb.	19,004	936,367	100,406	980,953	470,120	2,506,850
12-4 lb.	254	7,632	11,968	55,394	15,052	90,300
Total	156,184	1,898,543	325,525	1,389,202	566,472	4,335,926

Pacific salmon packing season. Adding the 1965 new season pack of 3,541,187 standard cases brought the total available supply for the 1965/66 market season to 4,274,762 standard cases.

Shipments at the cannery level of all salmon species from July 1, 1965, to June 1, 1966, totaled 3,358,876 standard cases. The carryover of 733,575 standard cases on July 1, 1965, the beginning of the 1965/66 sales year, was substantially lower (37.6 percent) than the carryover of 1,175,588 cases a year earlier.

Data on canned salmon stocks are based on reports from U. S. Pacific Coast canners who packed over 96 percent of the 1965 salmon pack. (Division of Statistics and Economics, National Cannery Association, June 25, 1966.)

Note: See *Commercial Fisheries Review*, July 1966 p. 43.

FINGERLINGS ARE "BRANDED" IN MIGRATION STUDIES:

About 1 1/2-million young salmon are being "branded" at the U. S. Department of the Interior's Little White Salmon National Fish Hatchery (near White Salmon, Wash.), announced the Department's Northwest Regional Information Office, May 26, 1966. But the branding is accomplished by a cold method instead of the hot iron technique long used in cattle identification.

The young salmon are held to the branding "iron" for a fraction of a second, imprinting a permanent mark on the skin. It does not harm the fish. The brand merely changes the coloration from light silver to dark gray or black in the area contacted.

The unique branding technique is designed to keep track of the seaward-bound migrant fish in a comprehensive study of the timing and survival of fingerlings taking place in the Columbia and Snake rivers. The

research is conducted by the Seattle office of the Interior Department's Bureau of Commercial Fisheries.

The new method is faster than fin-clipping and increases chances of survival because it does not impair fish mobility. Brands have lasted through the fresh-water life of the fish but it is not known if they will last through lengthy periods in the sea. The mark has lasted up to six months in salt water.

Fingerlings are placed in a tranquilizer and then are held one by one against the branding point, which is a silver U mounted on the end of a 6-inch brass rod. The brass rod extends through the wall of an insulated container filled with dry ice and wood alcohol to create a subfreezing temperature of -68° F. The brass rod conducts the extreme cold to the silver U against which the fingerling is held for branding. Branding takes but an instant and then the fish is placed in a recovery tank.

The U-shaped brand is used as is, inverted, or lying sideways. It is placed on different locations of the fish's body and on either side. A total of 16 different mark combinations are possible from this one U mark.

The 500,000 small salmon that are being branded are fall chinook salmon that were hatched at Spring Creek Hatchery (at Underwood, Wash.) and reared at Big White Salmon Hatchery. The hatchery rearing of the young fish is done by Interior's Bureau of Sport Fisheries and Wildlife.

Branded fish will be released in a turbine and in the tailrace of Ice Harbor Dam on the Snake River and below Priest Rapids and McNary dams on the Columbia River. They will be recaptured at collecting sites at McNary, the Dalles and Bonneville dams, and finally in the estuary at Astoria, Oreg., before the young fish go to the sea.

Scientists are studying the watery environment of the fingerling before additional dams go into operation in the Columbia and Snake rivers. By comparing returns from each release site, biologists should be able to answer such questions as: Can fingerlings adjust to the changing environment of the Columbia River? Can safe fingerling bypasses be developed at "high mortality" areas in the river? How do the large impoundments affect the seaward-bound fish?

The broad scientific study is under the Fish-Passage Research Program of the Bureau of Commercial Fisheries, Seattle, with Howard L. Raymond, fishery research biologist, in charge of the project. He is assisted by other biologists from Washington and from Astoria, Ore. This is a joint project with the states of Oregon, Washington, and Idaho. The comprehensive fingerling study will continue for several years.

This branding technique has been developed for the most comprehensive and far-reaching study of the fingerling salmon ever undertaken in the Columbia River basin. Information is lacking about the fingerlings' downward journey to the sea. Much more is known about the adult upstream migration to their ancestral spawning grounds, so scientists are researching to fill in the gap on missing knowledge of the fingerlings.



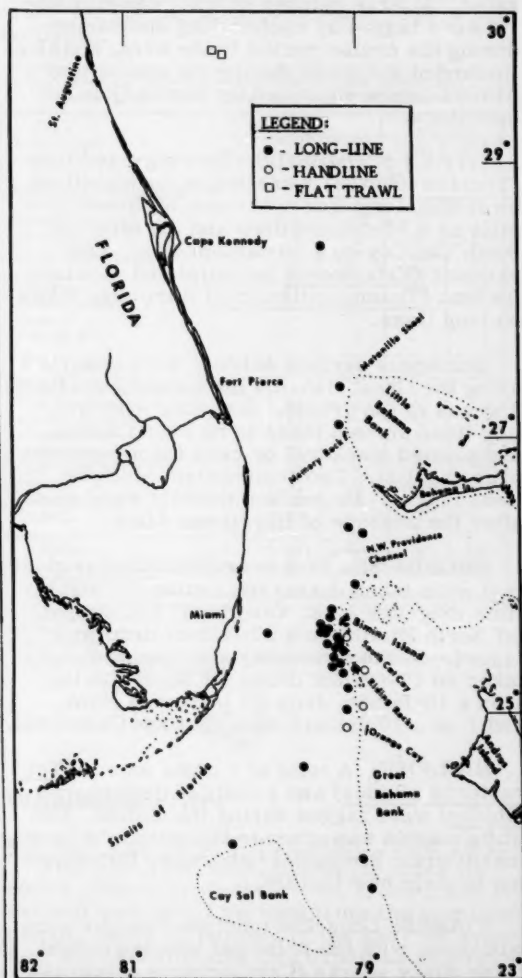
South Atlantic Fisheries Explorations and Gear Development

MIGRATIONS AND SEASONAL DISTRIBUTION OF PELAGIC FISH IN FLORIDA STRAITS STUDIED:

M/V "Oregon" Cruise 109 (May 16-June 16, 1966): A 32-day cooperative study of pelagic fish in the Florida Straits and along the Great Bahama Bank was completed June 16, 1965, by the exploratory fishing vessel Oregon, operated by the Bureau of Commercial Fisheries, U. S. Department of the Interior. Participants in the study included the Bureau's Exploratory Fishing and Gear Research Base, Pascagoula, Miss.; Exploratory Fishing Station, St. Simons Island, Ga.; the Bureau's Tropical Atlantic Biological Laboratory at Miami; Woods Hole Oceanographic Institution; Institute of Marine Science, University of Miami; and the International Game Fish Association. Opera-

tions aboard the Oregon were under the joint control of the Bureau and Woods Hole Oceanographic Institute (WHOI).

Objectives of the cruise were to: (1) study the mechanics of bluefin tuna (*Thunnus thynnus*) migrations along the Great Bahama Bank, (2) gather information on the seasonal distribution and composition of surface tuna schools, and (3) continue observations on the distribution and density patterns of subsurface swordfish populations. Long lines were used for sampling subsurface stocks and trolling lines were used on surface schools.



Area of operations during M/V Oregon Cruise 109 (May 16-June 16, 1966).

BLUEFIN TUNA: A total of 31 sets (total of 8,620 hooks) was made along the Great Bahama Bank and off Cay Sal Bank in the Florida Straits for bluefin tuna. The hooks were baited with mullet, blue runners, and thread herring and were fished on drops varying from surface to 50 fathoms. Only one bluefin (a 350-pound specimen) was taken which was caught off Brown Cay on a 20-fathom drop. Considering the effort expended with long lines and the negative results, there appears to be a strong indication that migrating bluefin are not available to long-line gear at that time within the region investigated. A large number of troll-caught bluefin were tagged by cooperating sportsmen during the cruise period in the area, and bluefin landed at Bimini during the sports tournaments were examined by Woods Hole co-operators.

OTHER SCOMBRIDS: Two big-eyed tuna (*Thunnus obesus*) were taken on nighttime swordfish long-line sets--one off South Bimini on a 20-fathom drop and the other off South Cat Cay on a 50-fathom drop. One skipjack (*Katsuwonus pelamis*) and 4 blackfin tuna (*Thunnus atlanticus*) were also taken on long lines.

Numerous surface schools were observed along the Great Bahama Bank during the first 3 weeks of the cruise. Sampling with trolling lines showed these to be blackfin tuna and painted mackerel or cero (*Scomberomorus ragalis*). Two troll-caught blackfin were tagged. No surface schools were seen after the passage of Hurricane Alma.

SWORDFISH: Five swordfish (*Xiphias gladius*) were taken during the cruise on nighttime long-line sets. One small fish caught off North Bimini on a 20-fathom drop was tagged. Of the remaining specimens, 2 were taken on 10-fathom drops off South Bimini, 1 on a 10-fathom drop off Matanilla Bank, and 1 on a 10-fathom drop off Cape Canaveral.

BILLFISH: A total of 7 white marlin (*Tetrapterus albidus*) and 1 sailfish (*Istiophorus albidus*) were tagged during the cruise. One white marlin was given to the Bureau's Tropical Atlantic Biological Laboratory for mounting in their new facility.

SHARKS: Long-line catches of sharks were moderate, with the principal species caught being dusky sharks (*Carcharhinus obscurus*), silky sharks (*C. floridanus*), night sharks

(*Hypoprion signatus*), hammerhead sharks (*Sphyrna mokarran*), and mako sharks (*Isurus oxyrinchus*). About 500 pounds of shark meat and liver, representing 50-pound samples from each species and sex, were collected for the Bureau's Technological Laboratory at Seattle, Wash.

A 300-pound sample of dolphin (*Coryphaena hippurus*) was caught for test marketing by industry. Samples of hake (*Merluccius albidus*) were taken by trawl on the royal-red shrimp grounds off St. Augustine, Fla., for the Bureau's Biological Laboratory, La Jolla, Calif.

OCEANOGRAPHIC COLLECTIONS: Bathymograph and Nansen bottle casts were made by WHOI participants at each long-line station for determination of temperature structure, dissolved oxygen, salinity, nitrate, and nitrite concentrations. Vertical and horizontal plankton tows were made for investigation of zooplankton structures and chlorophyll levels.



U. S. Fishing Vessels

FISHERIES LOAN FUND

AND OTHER FINANCIAL AID

FOR VESSELS, APRIL 1-JUNE 30, 1966:

From the beginning of the program in 1956 through June 30, 1966, a total of 1,830 applications for \$46,458,719 was received by the U. S. Bureau of Commercial Fisheries, the agency administering the Federal Fisheries Loan Fund. By that date, 957 applications (\$21,119,566) had been approved, 581 (\$13,414,413) had been declined or found ineligible, 260 (\$9,141,502) had been withdrawn by the applicants before being processed, and 32 (\$697,608) were pending. Of the applications approved, 347 were approved for amounts less than applied for--the total reduction was \$2,085,630.

The following loans were approved from April 1, 1966, through June 30, 1966:

New England Area: Earl L. Brewer, Boothbay, Me., \$7,100; Arthur Reposa, Narragansett, R. I., \$17,000; Arthur Reposa, Narragansett, R. I., \$35,000; James J. Mello, Wakefield, R. I., \$58,000.

South Atlantic and Gulf Area: John Joseph Ross, Moss Point, Miss., \$29,332.

California Area: Veryl W. Dawson, Aromas, \$4,973; Chester L. Russell, Napa, \$6,240; Charles W. Beyers, Santa Cruz, \$4,760; Frank Brenha, Jr., San Diego, \$140,000; Curtt M. Olsen, San Diego, \$17,872.

Pacific Northwest Area: Howard Vining, Brookings, Oreg., \$21,000; and the following from Washington State: James P. Allenbaugh, Aberdeen, \$22,000; George A. Bold, Aberdeen, \$71,250; Jack M. Torgerson, Aberdeen, \$60,000; John C. Edwards, Hoquiam, \$30,000; James D. Barclay, Marysville, \$12,000; Ronald D. Watson, Marysville, \$9,380; Tage B. Rasmussen, Tacoma, \$3,276; Iceland Boat Co., Seattle, \$89,000; Parks Canning Co., Inc., Seattle, \$75,000.

Alaska Area: Charles L. Johnson, Anchor Point, \$15,000; Truman C. Emberg, Dillingham, \$6,345; Glenn J. Couch, Homer, \$6,662; Richard T. Hinde and Ole G. Harder, Kodiak, \$109,000; Jake M. Hallingstad, Petersburg, \$9,500; Samuel Martin, Seldovia, \$16,000; LeRoy Hollman, Seward, \$4,800.

Under the Fishing Vessel Mortgage Insurance Program (also administered by the Bureau) during the second quarter of 1966, a total of 13 applications for \$656,000 was received. Since the program began (July 5, 1960), 122 applications were received for \$10,378,245. Of the total, 93 applications were approved for \$6,721,656 and 16 applications for \$1,785,600 were pending as of June 30, 1966. Since the mortgage insurance program began, applications received and approved by area are:

New England Area: Received 15 (\$1,796,750), approved 11 (\$1,367,178).

California Area: Received 2 (\$1,262,000), approved 2 (\$1,262,000).

South Atlantic and Gulf Area: Received 85 (\$4,816,524), approved 66 (\$3,092,169).

Pacific Northwest Area: Received 13 (\$2,127,375), approved 8 (\$635,535).

Alaska Area: Received 7 (\$375,596), approved 6 (\$364,774).

The first applications for a Fishing Vessel Construction Differential Subsidy under the Bureau's expanded program were received in December 1964. Through June 30, 1966, a total of 69 applications for an esti-

mated \$16,867,000 in subsidies had been received. Public hearings on 48 applications were held--40 applications for estimated subsidies totaling \$8,278,500 were approved and 8 subsidy contracts in the amount of \$1,214,558 were executed.

Note: See Commercial Fisheries Review, June 1966 p. 36.

DOCUMENTATIONS ISSUED AND CANCELLED, APRIL 1966:

During April 1966, a total of 75 vessels of 5 net tons and over was issued first documents as fishing craft as compared with 63 in April 1965. The number of documents cancelled for fishing vessels in April 1966 is not available.

U. S. Fishing Vessels 1/--Documentations Issued and Cancelled, by Areas, April 1966 with Comparisons				
Area (Home Port)	April		Jan.-Apr.	
	1966	1965	1966	1965
..... (Number)				
Issued first documents 2/:				
New England	6	4	9	11
Middle Atlantic	2	-	3	3
Chesapeake	5	3	25	11
South Atlantic	8	7	19	23
Gulf	19	35	79	84
Pacific	33	13	68	46
Great Lakes	2	-	4	1
Hawaii	-	-	1	-
Puerto Rico	-	1	-	1
Total	75	63	208	180
Removed from documentation 3/:				
New England	4/	6	4/	15
Middle Atlantic	3/	-	3/	10
Chesapeake	3/	2	3/	8
South Atlantic	3/	11	3/	32
Gulf	3/	8	3/	37
Pacific	3/	8	3/	29
Great Lakes	3/	1	3/	8
Hawaii	3/	-	3/	1
Total	4/	36	4/	140

1/Includes both commercial and sport fishing craft. A vessel is defined as a craft of 5 net tons and over.

2/There were 2 redocumented vessels in April 1966 previously removed from the records. Vessels issued first documents as fishing craft were built: 51 in 1966; 4 in 1965; 1 in 1962; and 19 prior to 1957.

3/Includes vessels reported lost, abandoned, forfeited, sold alien, etc.

4/Not available.

Source: Monthly Supplement of Merchant Vessels of the United States, Bureau of Customs, U.S. Treasury Department.



Wholesale Prices

EDIBLE FISH AND SHELLFISH, JUNE 1966:

The June 1966 wholesale price index for edible fishery products (fresh, frozen, and canned) was up 0.2 percent from the previous month. At 127.2 percent of the 1957-59 average, the overall index this June was 16.9 per-

cent higher than the same month a year earlier. Prices this June, with few exceptions, were sharply higher than in the same month of 1965.

Lower prices in June 1966 for ex-vessel large haddock at Boston (down 6.6 percent), Lake Superior fresh whitefish at Chicago (down 23.6 percent), and Great Lakes round yellow pike at New York City (down 18.6 percent) were offset by higher prices at New York City for western fresh king salmon (up 8.6 percent) as compared with prices for frozen salmon marketed the previous month. June prices were up slightly for western fresh and frozen halibut (up 1.6 percent). As a result, the subgroup index for drawn, dressed, or whole finfish was up 1.3 percent from May to June. As compared with June 1965, the subgroup index this June was higher by 7.2 percent--prices were up from a year earlier for all items except whitefish (down 13.1 percent). Prices for western halibut were 10.3 percent higher than in June 1965; by 8.2 percent for salmon; and by 7.5 percent for large haddock.

Prices at New York City for South Atlantic fresh shrimp were lower by 4.2 percent from May to June because of increased market supplies. Although June prices were higher at Boston for fresh haddock fillets (up 9.3 percent), the subgroup index for processed fresh fish and shellfish was down 1.8 percent from the previous month due solely to the lower prices for shrimp. Prices remained unchanged for standard shucked oysters. As compared with June 1965, the subgroup index this June was up 20.8 percent because of substantially higher prices for all items. June 1966 fresh shrimp prices were up 29.1 percent from the same month a year earlier, small haddock fillets (up 15.5 percent), and oysters (up 12.2 percent).

The June 1966 subgroup index for processed frozen fish and shellfish rose 1.4 percent from the previous month. June prices were higher at Chicago for frozen shrimp (up 1.8 percent) and at Boston for frozen haddock fillets (up 1.2 percent); for other items in the subgroup there was no change. The subgroup index this June was 17.7 percent higher than in the same

Wholesale Average Prices and Indexes for Edible Fish and Shellfish, June 1966 with Comparisons

Group, Subgroup, and Item Specification	Point of Pricing	Unit	Avg. Prices 1/ (\$)		Indexes (1957-59=100)			
			June 1966	May 1966	June 1966	May 1966	Apr. 1966	June 1965
ALL FISH & SHELLFISH (Fresh, Frozen, & Canned)					127.2	126.9	126.5	108.9
Fresh & Frozen Fishery Products:					128.3	127.8	125.0	111.5
<u>Drawn, Dressed, or Whole Finfish:</u>					121.5	119.9	116.6	113.3
Haddock, lge., offshore, drawn, fresh	Boston	lb.	.12	.13	94.8	101.5	92.0	88.2
Halibut, West., 20/80 lbs., drsd., fresh or froz.	New York	lb.	.48	.48	142.7	140.5	140.5	129.4
Salmon, king, lge. & med., drsd., fresh or froz.	New York	lb.	.94	.87	131.3	120.9	120.5	121.4
Whitefish, L. Superior, drawn, fresh	Chicago	lb.	.54	.70	79.8	104.4	78.3	91.8
Yellow pie, L. Michigan & Huron, rnd., fresh . .	New York	lb.	.61	.75	99.9	122.8	139.1	90.1
Processed, Fresh (Fish & Shellfish):					132.4	134.8	130.1	109.6
Fillets, haddock, sml., skins on, 20-lb. tins	Boston	lb.	.41	.38	99.6	91.1	97.2	88.2
Shrimp, lge. (26-30 count), headless, fresh . .	New York	lb.	1.15	1.20	134.7	140.6	128.9	104.3
Oysters, shucked, standards	Norfolk	gal.	8.00	8.00	134.9	134.9	137.0	120.2
Processed, Frozen (Fish & Shellfish):					125.5	123.8	123.0	106.6
Fillets: Flounder, skinless, 1-lb. pkg.	Boston	lb.	.43	.43	109.0	109.0	109.0	98.8
Haddock, sml., skins on, 1-lb. pkg.	Boston	lb.	.39	.39	114.3	112.9	112.9	108.5
Ocean perch, lge., skins on 1-lb. pkg.	Boston	lb.	.33	.33	114.0	114.0	112.2	105.2
Shrimp, lge. (26-30 count), brown, 5-lb. pkg.	Chicago	lb.	1.12	1.10	132.8	130.4	129.2	105.5
Canned Fishery Products:					125.6	125.6	129.6	104.9
Salmon, pink, No. 1 tall (16 oz.), 48 cans/cs.	Seattle	cs.	28.50	28.50	124.2	124.2	124.2	95.9
Tuna, lt. meat, chunk, No. 1/2 tuna (6-1/2 oz.), 48 cans/cs.	Los Angeles	cs.	13.69	13.69	121.5	121.5	131.8	102.6
Mackerel, jack, Calif., No. 1 tall (15 oz.), 48 cans/cs.	Los Angeles	cs.	8.00	8.00	135.6	135.6	129.3	120.9
Sardines, Maine, keyless oil, 1/4 drawn (3-3/4 oz.), 100 cans/cs.	New York	cs.	10.25	10.25	131.5	131.5	131.5	131.5

1/Represent average prices for one day (Monday or Tuesday) during the week in which the 15th of the month occurs. These prices are published as indicators of movement and not necessarily absolute level. Daily Market News Service "Fishery Products Reports" should be referred to for actual prices.

Source: U. S. Department of Labor, Bureau of Labor Statistics.

month in 1965. Prices were generally higher for all items in the subgroup--substantially higher for frozen shrimp (up 25.9 percent) and flounder fillets (up 10.3 percent).

Prices for all canned fishery products were unchanged from May to June 1966. Market conditions were steady to firm and stocks of several products, particularly canned salmon, were low. But compared with



the same month a year earlier, the index this June was up 19.7 percent. Prices were higher than in June 1965 for canned pink salmon (up 29.5 percent), canned tuna (up 18.4 percent), and California jack mackerel (up 12.2 percent). Prices for canned Maine sardines remained unchanged for each of the months indicated. (U. S. Department of the Interior, Bureau of Commercial Fisheries, Fishery Market News Service.)



BEAR PREDATION ON SALMON UNDER STUDY IN ALASKA

An electric fence is in place to keep Alaskan brown bears out of part of Grassy Point Creek, a tributary of Karluk Lake 80 miles west of Kodiak, Alaska. The electric fence was put up to help biologists find out how extensively bears prey on the salmon in the stream. The project was described in September 1965 by the scientist in charge of the Karluk Lake Field Station of the U. S. Bureau of Commercial Fisheries.

Salmon population in the controlled section of the bearless stream will be compared to the number of fish in the stream where bears may freely wander. The effect on salmon populations and egg deposition will be considered. It's part of comprehensive studies to consider all the factors in a salmon's environment and survival.

When a bear takes an unspawned female sockeye (red) salmon for his dinner he is also destroying from 3,000 to 5,000 eggs. With a high bear population the number of eggs destroyed by the huge animals is sizable.

Some surprising problems have come up in the study. For one thing "bruin" isn't cooperating completely. He likes salmon too well. He's willing to endure a strong, painful electric shock to break the wires and get into the salmon stream. As a result, scientists are constantly repairing the electric fence.

The bear predation study was started in 1964. In areas where bears are allowed to prey on salmon, the remains of dead salmon gather and scientists determine the spawned to unspawned ratio. In 1964, only 15 percent of the bear-killed female salmon were unspawned. Most of the fish taken by the "brownies" had already spawned. In the summer of 1965, bear predation on salmon appeared to be at a minimum. Biologists pump salmon eggs from the stream to learn the number of eggs deposited in areas with bear predation and the numbers without.

The study may show that the total effect of the bears on the salmon resource is minor, but this remains to be determined.



FOREIGN

International

FISH MEAL

PRODUCTION AND EXPORTS FOR SELECTED COUNTRIES, JANUARY-FEBRUARY 1966:

Member countries of the Fish Meal Exporters' Organization (FEO) account for about 90 percent of world exports of fish meal. The FEO countries are Chile, Angola, Iceland, Norway, Peru, and South Africa/South-West Africa.

Table 1 - Exports of Fish Meal by Member Countries of the FEO, January-February 1966

Country	Feb.		Jan.-Feb.	
	1966	1965	1966	1965
.. (1,000 Metric Tons) ..				
Chile	20.1	6.2	26.8	15.2
Angola	1/	4.7	2/3.4	12.1
Iceland	12.3	6.0	26.2	15.6
Norway	14.3	12.5	36.9	25.7
Peru	118.2	130.2	263.0	295.1
So. Africa (including S.-W. Africa)	3.9	4.6	10.6	15.9
Total	168.8	184.2	366.9	379.6

Table 2 - Production of Fish Meal by Member Countries of the FEO, January-February 1966

Country	Feb.		Jan.-Feb.	
	1966	1965	1966	1965
.. (1,000 Metric Tons) ..				
Chile	26.8	10.9	60.6	23.7
Angola	1/	3.7	2/3.4	10.6
Iceland	7.4	5.0	12.8	9.2
Norway	29.2	18.7	32.6	24.6
Peru	179.3	122.3	421.7	316.4
So. Africa (including S.-W. Africa)	17.0	22.6	21.2	31.3
Total	259.7	183.2	552.3	415.8

1/ Data not available.

2/ Data available only for January 1966.

INTERNATIONAL NORTH PACIFIC FISHERIES CONVENTION

JAPAN ASKS REMOVAL OF ABSTENTION LINE:

Removal of the "abstention line" which bars Japan from taking North Pacific salmon

on the high seas east of 175° W. longitude was called for in a speech on May 25, 1966, by Japanese Consul General Yoshio Nara. The Consul General told a meeting of the Seattle (Washington) Junior Chamber of Commerce that "salmon fishing on the high seas would then be carried on from the practical and scientific view point of conservation and the full-est possible utilization of the salmon stocks." He described the salmon as a special kind of fish which returns to its homeland to spawn.

The Consul General pledged his country to the cause of conservation saying "Japan pays great respect to the United States' effort for conservation of salmon stocks. At the same time my country thinks that the growth of salmon from two or three inches to several feet is due to the heavenly benefits of the high seas." He pointed out that Japan has adopted conservation measures including a system to limit the number of fishing vessels in some areas. He believed that prospects were bright for fisheries cooperation between Japan and the U.S. He pointed out that two Japanese companies had entered into joint ventures with American companies in Alaska to can salmon and to produce other fishery products. He cited the growth of Japanese imports of salted salmon roe from the United States from a value of \$330,000 in 1961 to an estimated \$4 million in 1966. (*Post Intelligencer*, Seattle, May 26, 1966.)

CODEX ALIMENTARIUS

THIRD MEETING OF COMMITTEE ON FOOD HYGIENE:

The Third Meeting of the Committee on Food Hygiene of the Codex Alimentarius Commission was held in Rome, May 31-June 3, 1966. (The Codex Alimentarius Commission is working to establish international food standards. Through its various committees, the Commission provides a mechanism for preparing and obtaining Government acceptance of these uniform standards. The Food Hygiene Committee is concerned with hygiene codes of practice which can be incorporated

International (Contd.):

into individual commodity standards by the separate Commodity Committees. The entire program is jointly sponsored by the Food and Agriculture Organization and the World Health Organization.)

The main work of the Food Hygiene Committee at its Rome meeting was the revision of the paper on "General Principles of Food Hygiene." The revised document reflects many comments offered by member countries and interested groups. An important revision was to broaden the use of clean water permissible for such purposes as washing, so as to include clean sea water where applicable. This takes into consideration the limited supply of potable water aboard fishing vessels and at some shore facilities.

The revised "General Principles of Food Hygiene" was considered ready for submission to the Codex Alimentarius Commission.

No draft hygiene codes of practice for fish and shellfish were presented at the Meeting. Countries having responsibility for items concerning fish and shellfish directly or indirectly were instructed to revise their reports so as to take into consideration the amended basic document, "General Principles of Food Hygiene," and the instructions of the Hygiene Committee to use sections of these principles verbatim whenever possible.

The question of including retail food handling in hygiene codes was discussed briefly. The Chairman concluded this discussion by noting that the Hygiene Committee should consider hygiene codes from production to retailing for certain products, for example, molluscan shellfish.

The Committee also discussed problems concerned with standards for feedstuffs and frozen foods. The Committee decided that it would be necessary to maintain a distinction between frozen foods generally and frozen precooked foods.

The Food Hygiene Committee will probably hold its next meeting in June 1967. (U.S. Embassy, Copenhagen, June 15, 1966.)

Notes: (1) The Third Meeting of the Committee on Food Hygiene was attended by delegates from Australia, Canada, Cuba, Denmark, Ireland, Italy, Netherlands, Poland, Portugal, Sweden, Switzerland, Turkey, United Kingdom, and the United States, as well as by representatives from the World Health Organization, Food and Agriculture Organization, European Economic Community, and the Organization for Economic Cooperation and Development.

(2) See Commercial Fisheries Review, Feb. 1966 p. 44.

OCEANOGRAPHY

UNITED STATES EXHIBIT
IN GERMANY RESCHEDULED:

The U. S. Department of Commerce has rescheduled its oceanographic equipment symposium and exhibition in Frankfurt, Germany, to capitalize on a rising tide of international interest in the event. The symposium and show at the U. S. Trade Center in Frankfurt, originally set August 31-September 7, will be held November 2-9, 1966, by the Department's Bureau of International Commerce.

After the first announcement of the symposium-exhibition in early April, preliminary development work indicated such widening interest that it was decided to reschedule the event to permit a broader development campaign.

The Trade Center symposium will feature technical papers by U. S. and foreign experts on ocean sciences and engineering. The exhibition will be a show-and-sell promotion of the newest in U. S. oceanographic equipment, systems, and services.

U. S. firms interested in the event may obtain additional information from the Bureau of International Commerce, U. S. Department of Commerce, Washington, D. C. 20230.

NORTH-EAST ATLANTIC FISHERIES COMMISSION

FOURTH ANNUAL MEETING:

The North-East Atlantic Fisheries Commission (NEAFC) held its Fourth Annual Meeting, May 10-13, 1966, at Edinburgh, Scotland. The meeting was attended by delegates from all member countries (Belgium, Denmark, West Germany, France, Iceland, Ireland, the Netherlands, Norway, Poland, Portugal, Spain, Sweden, U.S.S.R., and the United Kingdom). Observers were present from the United States, the International Council for the Exploration of the Seas (ICES), the International Commission for the Northwest Atlantic Fisheries (ICNAF), and the Food and Agriculture Organization (FAO).

The NEAFC is concerned with the conservation of fish stocks and the rational exploitation of the North-East Atlantic Ocean. The NEAFC may make recommendations to member countries for measures concerned with (1) fish gear, (2) size limits of fish, (3) closed seasons, (4) closed areas, and (5) improvement and the increase of marine resources.

International (Contd.):

The main subjects on the agenda of the Fourth Annual NEAFC Meeting were (1) report by the Committee for Liaison with ICES; (2) second report of the Committee on International Control; (3) mesh size in the Northern part of the Convention area; (4) general principles of effort regulation; (5) conservation of herring stocks in the Convention area; and (6) use of topside chafers.

The Committee for Liaison with ICES reported that there was widespread failure to achieve the Commission's requirements with respect to minimum mesh sizes and the use of topside chafers.

The report of the Committee on International Control included the question of mesh regulation. Delegates agreed that there was a need for early institution of international

Argentina

TUNA FISHERIES, 1960-1964:

La Pesca de los Trínidos en la Republica Argentina, Años 1960-1964 (Fishing of Tuna in the Argentine Republic), issued by the Department of Fishery Investigations (November 1965), reviews the activities of the Argentine tuna fleet for 1960 through 1964. Reported are the catches made and the areas of tuna fishing activity, which is still in the beginning stages in Argentina.

The tuna fishery started in 1959 as a joint Japanese-Argentine enterprise with operations by the vessels Eisei Maru and Foca I.

Table 1 shows the catch of tuna by species and by year for 1960-64. Albacore tuna was by far the dominant species taken in the catch, followed by big-eyed tuna. The fishing method used was the long line.

Table 1 - Argentine Annual Catch of Tuna and Related Species, By Species, 1960-1964

Species	1964	1963	1962	1961	1960	Total
(Metric Tons)						
Tuna:						
Albacore	1,492.8	1,546.5	749.1	1,471.9	1,802.3	7,062.6
Yellowfin	128.5	78.0	22.9	25.3	1.9	256.6
Bluefin	204.1	270.7	105.5	-	-	580.3
Big-eyed	187.0	235.0	213.4	162.5	56.1	854.0
Total tuna	2,012.4	2,130.2	1,090.9	1,659.7	1,860.3	8,753.5
Swordfish	507.9	399.5	196.2	110.9	281.2	1,495.7
Snake mackerel	14.2	18.2	14.2	7.3	-	53.9
Grand Total	2,534.5	2,547.9	1,301.3	1,777.9	2,141.5	10,303.1

control, but there was insufficient time to review the Committee report in detail. Therefore, the NEAFC has called a special meeting in London beginning November 15, 1966 (tentative date), to discuss international control. Member countries have been asked to submit written comments before the opening of the special meeting in London.

Other developments at the meeting included provisions for member countries to submit their views by February 1, 1967, on the problem of effort regulation so that this subject can be discussed at the next NEAFC annual meeting. During a discussion of topside chafers, hope was expressed that chafers could be completely forbidden by 1968.

At the invitation of the French Government, the Fifth Annual NEAFC Meeting will be held in Paris, beginning May 9, 1967. (Regional Fisheries Attache for Europe, U.S. Embassy, Copenhagen, May 25, 1966.)

Note: See Commercial Fisheries Review, Aug. 1965 p. 64.



For the purposes of this report, the fishing areas have been divided into statistical rectangles of 5° latitude and longitude as recommended by the "panel of experts of FAO in order to facilitate investigations regarding the tuna".

Table 2 gives the catch of tuna and related species by statistical area for the South At-

Table 2 - Argentine Catch¹ of Tuna and Related Species By Major Statistical Area and Number of Vessel Trips

Statistical Area	Catch Metric Tons	Trips No.	Catch Per Trip Metric Tons
Between lat. 30° and 35°, long. 45° and 50°	984.9	16	61.6
Between lat. 30° and 35°, long. 50° and 55°	2,552.5	66	38.7
Between lat. 35° and 40°, long. 50° and 55°	1,685.2	19	88.7
Between lat. 15° and 20°, long. 20° and 25°	2,584.4	13	198.8
Between lat. 20° and 25°, long. 20° and 25°	873.4	6	145.6
Other	1,622.7	16	101.4
Totals	10,303.1	136	75.8
¹ /Includes albacore, yellowfin, bluefin, and big-eyed tuna; swordfish; and snake mackerel.			

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Argentina (Contd.):

lantic. During the 5 years under consideration, the highest catch per trip (198.8 metric tons) was obtained off Brazil between latitudes 15° and 20°, and longitudes 20° and 25°.

Most of the 1966 Australia catch was canned for local consumption; 5 shipments totaling 2,400 tons were exported, mostly to the United States where tuna prices were at a record level.

Table 3 - Argentina Catch¹ of Tuna and Related Species, By Month, 1964, and Vessel and Gear Efficiency

Month	Trips	Number of Hours		Long-Line Sets	Total Catch	Average Catch Per Trip	Average Catch Per Long-Line Set
		For Trips	Fishing Time Only				
		(Number)				(Metric Tons)	
January	3	3,248	2,364	115	451.6	150.5	3.9
February	1	1,024	810	43	105.6	105.6	2.4
March	1	1,091	850	45	106.1	106.1	2.3
April	2	2,866	1,190	65	119.5	59.7	1.8
May	2	2,535	1,130	93	242.3	121.1	2.6
June	1	915	570	30	125.1	125.1	4.1
July	2	2,224	1,325	96	270.8	135.4	2.8
August	3	3,363	1,350	93	414.5	138.1	4.4
September	1	1,045	600	35	101.7	101.7	2.9
October	3	2,385	1,458	81	317.4	105.8	3.9
November	-	-	-	-	-	-	-
December	2	2,297	890	59	279.9	139.9	4.7
Totals	21	22,993	13,037	755	2,534.5	120.6	3.3

¹Includes albacore, yellowfin, bluefin, and big-eyed tuna; swordfish; and snake mackerel.

The fleet consisted of three vessels in 1964, the Centauro, Eikyo Maru, and Foca II. Those 3 vessels were each about the same length (118 feet) and size (275 gross tons), and possessed about the same hold capacity (230 cubic meters). Each vessel operated with a crew of about 27 members. The catch during 1964, by month, for those vessels, including data on vessel and gear efficiency, are given in table 3. January, June, August, October, and December were the best fishing months in 1964.



Australia

TUNA CATCH, 1965/66 SEASON:

South Australia's 1966 tuna catch was a record 6,482 short tons on April 24, when the season was drawing to a close. This was 419 tons more than the previous highest total of 6,063 tons in 1964, and 1,263 tons more than in 1965. The season's record catch was made by a larger fleet--31 vessels at the peak, 10 more than in 1965.

The 1965/66 New South Wales season was disappointing; the catch was 2,476 tons as compared with 2,600 tons the previous season, but the overall Australian total by April 24 was 8,954 tons, only 20 tons short of the 1963/64 record. Twenty-three vessels were still fishing at that date, and the season appeared likely to continue for another 3 weeks.

The Espirito Santo, which acted as a mothership for tuna vessels during the New South Wales and South Australian seasons, sailed late in April 1966 from Melbourne to purse seine for tuna in eastern Bass Strait. The former United States clipper planned to work in close cooperation with a spotting aircraft used in the Tasmanian and Victorian tuna survey. (Australian Fisheries Newsletter, May 1966.)



Brazil

NEW OCEANOGRAPHIC VESSEL
TO BE LAUNCHED IN 1967:

Dr. Martha Vannuzzi, Director of the Oceanographic Institute of the University of São Paulo, reports that the Institute's new oceanographic research vessel will be ready for delivery at Bergen, Norway, in April 1967. The vessel will be boarded at that time by a crew composed half of Norwegians and half of Brazilian scientists. On departure it will start a 4-months cruise for shakedown and delivery to the Port of Santos in Brazil. The cruise will take it along the African and Brazilian coasts and will provide an opportunity for comparative study of the Brazilian Current.

A name has not yet been chosen for the craft, but it will probably be called N. OC. W. Besnard. Dr. Besnard, a Norwegian scientist, was the founder of the Oceanographic Institute in São Paulo.

Brazil (Contd.):

The Institute Director intends to strengthen ties with United States oceanographers and marine biologists.

At this time, the Institute Director is endeavoring to recruit researchers, particularly specialists for fisheries, including fish technology, but also experts in shrimp biology and the basic chemical composition of species of commercial interest. Exploratory and stock fishery specialists assessment experts are also desired. Dr. Vannuzzi's main problem is in recruiting the specialists for fisheries and fish technology.

It will be recalled that the Institute is recipient of a Ford Foundation grant of \$545,000 for a 5-year period. According to its approved program, this grant is to be used for visiting researchers; for specialists on fishery methods and fish processing; on post-graduate training; for fellowships abroad and for equipment. The latter item includes some funds for the new building being constructed on the campus of the University of São Paulo, for a pier-side laboratory for fisheries to be constructed this year at Santos, and for some of the equipment on board the new oceanographic vessel. The Institute obviously has funds to move forward in its program, and is planning on the wise utilization of the funds. (U.S. Embassy, Rio de Janeiro, May 20, 1966.)

**Bulgaria****IMPORTS OF GREEK FISHERY PRODUCTS:**

During 1966, Bulgaria's imports of fresh, frozen, salted, and canned fishery products from Greece will amount to about US\$600,000 or 5 percent of all Greek exports to Bulgaria. This year's export commodity list (no details given) is based on a 1964 Trade Agreement between both countries (U. S. Embassy, Athens, April 20, 1966).

**Canada****LOBSTER FISHERMEN IN NEWFOUNDLAND TO BE COMPENSATED FOR STORM LOSSES:**

A joint Federal-Provincial program to compensate Newfoundland lobster fishermen

who suffered heavy trap losses in the severe storm of May 8, 1966, was announced May 17, 1966, by the Canadian Federal Fisheries Minister. The storm struck the west and south coasts of the Province.

The Federal and provincial governments will provide compensation to lobster fishermen in the area damaged by the storm at the rate of \$2.00 per trap. The compensation will be paid to each fisherman on the basis of the number of traps which he had in the water on May 8, 1966, providing that more than 35 percent of his traps were lost or destroyed.

No compensation will be paid under this program to any person who owned less than 35 lobster traps as evidenced in the declaration made when they applied for a lobster license for the 1966 season.

Any fisherman who receives compensation under this program must undertake during the 1966 season to replace the number of traps for which he claimed compensation, and must insure the replaced traps with the Canadian Fishermen's Indemnity Plan. (Canadian Department of Fisheries, Ottawa, May 17, 1966.)

FIRM PROMOTES FRESH-WATER FISH EXPORTS TO EUROPE:

For expanding exports of fresh-water fish to Europe, a Canadian firm won an award from the Manitoba Department of Industry and Commerce, March 31, 1966. The prize-winning firm was formed by two Manitoba fish processors for the sole purpose of exporting Manitoba fresh-water fish to Europe.

As the first stage in its export sales campaign, the firm concentrated on distributing a sales brochure, illustrating Manitoba's fresh-water fish, to fish importers throughout all of Western Europe. The president of the firm then made a sales trip to Europe. He covered 9 countries in 5 weeks and made sales presentations to 52 different importers. Since his return, an average of 2 shipments per week of 10,000 pounds each of northern pike and whitefish have been shipped from Manitoba to 21 active customers in France, West Germany, Belgium, Denmark, Sweden, and Finland. The company's export sales in 1966 are running 33 percent ahead of last year and should reach close to a million pounds. (U. S. Embassy, Ottawa, May 18, 1966.)



Cuba

SPINY LOBSTER LANDINGS AND EXPORTS:

In 1964, Cuba produced 900,000 pounds of spiny lobsters for export, primarily to West European countries (France and Spain). Cuba's total 1964 spiny lobster catch amounted to about 16 million pounds. In 1965, Cuba produced 19.8 million pounds, a record in recent years and more than in 1961 when about 18 million pounds were landed.

The Cuban Government, however, wants to increase landings and exports and has passed a special lobster plan. Under the plan several fishing methods harmful to the species are prohibited, spiny lobsters longer than 15 centimeters only can be landed, catching berried lobsters is outlawed, and the "shaving" of berried lobsters is punishable. The use of pots is now widely recommended. In addition to regulations, the Cuban regime hopes to promote future production by (1) building artificial corrals, (2) developing new coastal lobster grounds, and (3) initiating deep water fishing (exploratory testing is conducted by a French expert).

Spiny lobsters are landed by more than 20 fishery cooperatives as well as by the State-owned fishery located on one of the keys off Batabano Bay, the largest lobster fishing center in Cuba. Cuban lobsters are exported as frozen tails and as canned meat. Cuba hopes in the future to export up to 50 percent of the total landed weight by the reintroduction of deliveries of live lobsters.

Editor's Note: After the revolution, lobster fishermen converted water tanks on lobster boats into ice boxes which tripled the storage capacity of the boats. At the same time lobster fishermen began to practice il-

legal methods of fishing to increase the catch. Experience, however, has shown that only live lobsters can be processed into a product exportable to western countries. To increase such exports, the Cuban regime by law now has reintroduced the delivery of live lobsters.

PLANS FOR REVIVAL OF SPONGE INDUSTRY:

The sponge industry in Cuba flourished until 1937 when sponge diseases and over-exploitation reduced the resource. The National Institute of Fishing is now studying the possibility of introducing artificial sponge cultivation. Editor's note: A French expert is at present advising Cuban divers and modern diving equipment has been purchased in West European countries and the U.S.S.R. The main reason for the revival of the sponge industry is Cuba's need for foreign exchange obtainable by sponge exports.



Denmark

FISHERY EXPORTS, JANUARY-MARCH 1966:

Exports to All Countries: Total Danish fishery exports in January-March 1966 were down somewhat from the same period of 1965, reflecting the drop in landings during the first quarter of 1966. Average prices in 1966 were higher for all categories except fish oil. The leading markets for Danish fishery exports continued to be the European Common Market and the European Free Trade Association, although the Soviet Bloc countries increased their purchases of Danish fish meal during the period. West Germany was the leading

Table 1 - Danish Fishery Exports to All Countries, January-March 1966

Classification	January-March 1966			Change from 1965	
	Quantity Metric Tons	Value		Quantity Percentage	Value
		Kr. 1,000	US\$1,000		
Fresh	40,661	92,561	13,412	- 26	- 3
Frozen	11,160	50,794	7,360	- 2	+ 10
Salted	1,544	6,710	972	- 15	- 14
Smoked	190	3,155	457	+ 2	+ 26
Canned:					
Fish	1,379	5,989	868	- 19	- 9
Shellfish	379	3,234	469	- 8	- 4
Semipreserved:					
Fish	503	3,460	501	- 4	+ 6
Shellfish	204	2,275	330	- 3	+ 35
Meal, solubles, ensilage, trout food, etc.	18,308	22,979	3,330	+ 2	+ 21
Total	74,328	191,157	27,699	- 17	+ 3
Fish oil 1/	7,772	10,289	1,491	- 9	- 12

1/January-February data only; fish oil data are shown separately because they are collected separately and are often delayed.
Source: Danish Ministry of Fisheries.

Denmark (Contd.):

Table 2 - Danish Fishery Exports to the United States, January-March 1966					
Commodity	January-March 1966			Change from 1965	
	Quantity	Value		Quantity	Value
	Metric Tons	Kr. 1,000	US\$1,000	... (Percentage)
Fresh and Frozen:					
Pond trout	70.4	460.5	66.7	- 16	- 22
Trout eggs	0.1	12.1	1.8	- 67	- 66
Flatfish 1/	6.3	72.4	10.5	- 54	+ 5
Fillets and blocks:					
Flatfish	11.4	52.2	7.5	+ 533	+ 358
Cod	1,966.2	8,847.5	1,282.0	+ 30	+ 47
Other	1.4	5.7	0.8	- 26	- 20
Norway lobster	11.8	346.3	50.2	- 56	- 42
Total fresh & frozen	2,067.6	9,796.7	1,419.5	+ 26	+ 33
Salted 2/	3.0	9.7	1.4	- 40	- 56
Smoked 3/	0.4	8.1	1.2	- 20	- 35
Canned:					
Sprat & herring	151.9	903.3	130.9	- 37	- 13
Shrimp	19.0	200.4	29.0	+ 1	+ 13
Mussels	29.6	140.0	20.3	+ 2	+ 27
Other	14.1	71.4	10.3	+ 166	+ 174
Total canned	214.6	1,315.1	190.5	- 27	- 3
Semipreserved:					
Caviar	10.9	125.9	18.2	+ 65	+ 123
Other	16.6	25.6	3.7	+ 622	- 26
Total semipreserved	27.5	151.5	21.9	+ 209	+ 66
Fish solubles	125.0	125.0	18.1	- 17	- 18
Grand Total	2,438.1	11,406.1	1,652.6	+ 16	+ 27

1/Mostly turbot, brill, plaice, and soles.
2/Mostly cod.
3/Mostly salmon, trout, and eels.
Source: Danish Ministry of Fisheries.

country of destination, followed by the United Kingdom, Sweden, and the United States.

Exports to the United States: Danish fishery exports to the United States in the first quarter of 1966 were up 16 percent in quantity and 25 percent in value from the same period of 1965. The gain was due to larger shipments of frozen cod fillets and blocks which make up the bulk of Danish fishery shipments to the United States. There was a decline in shipments of pond trout and canned herring. (U. S. Embassy, Copenhagen, May 18, 1966.)



Ecuador

SHRIMP EXPORTS, 1965:

Ecuador's shrimp exports have increased steadily since 1962. There are seven firms now engaged in this export market and shrimp is shipped mainly to the United States. (U. S. Embassy, Quito, June 1, 1966.) Shrimp exports during 1962-65 and January-April 1966 were:

Year	Quantity Pounds
January-April 1966	1,481,556
1965	5,646,825
1964	5,384,759
1963	5,255,455
1962	5,095,374



Fig. 1 - Shrimp vessels at the dock of a shrimp firm in Guayaquil.



Fig. 2 - Shrimp vessels and plant of another shrimp firm in Guayaquil.

Ecuador (Contd.):



Fig. 3 - Small shrimp plant in Guayaquil. Refrigerated truck hauls shrimp from Esmeraldas.



PROPOSAL TO DEVELOP OFFSHORE FISHING FLEET:

A Committee for Ocean Fishing, which was appointed by the Finnish Agricultural Ministry, has recommended that Finland should make a greater effort to develop its Atlantic fishing fleet. Finland has at present only two vessels operating in the Atlantic, and these only in the summer months. (U. S. Embassy, Helsinki, June 11, 1966.)



France

FISHERY TRENDS, 1965:

Landings: French production of fish and shellfish was lower in 1965 than in 1964. This was due largely to the smaller than usual production of seasonal fish, notably herring, sardine, and tuna. In general, the French catch of the species for which demand is highest continued to decrease. In order to meet growing consumption, imports increased.



Fig. 1 - French conventional high-seas trawler (*Normandie-Bretagne*), operating out of Lorient.

Fishing Fleet: Construction of fishing vessels of modern design is being stepped up in France with a view to increasing competitiveness. This program while undertaken by private firms is being helped by the Government. The result hoped for is to reduce imports of fish. Artisan-type fishing still accounts for half of French production. But in 1965, a total of 52 vessels of more than 100 tons were placed in service. Of those, one was 70 meters (230 feet) in length and equipped for stern-trawling; 15 (including 7 stern trawlers) were from 40-52 meters (131-171 feet) in length (those 16 vessels were built in non-French yards); and 4 were 36 meters (118 feet) in length. By the end of 1965,



Fig. 2 - Stern trawler, *Adrien-Pla*, from the French port of La Rochelle.

the French fishing fleet had 3 freezer vessels, 2 of which were mixed vessels equipped for freezing and chilling). The other is the all-freezer vessel *Viking* which entered serv-



Fig. 3 - Emptying the cod end aboard a stern trawler.

France (Contd.):



Fig. 4 - Fishing vessels docked at the French port of Concameau. In June 1965 and produced over 1,000 metric tons of frozen fish in the last half of 1965. Four additional freezing vessels were ordered in 1965, of which 2 are of the mixed type and 2 (of 1,100 tons) are designed especially to produce frozen fillets.



Fig. 5 - Selling fish at auction, Lorient, France.

Marketing: According to studies made by the European Economic Community (EEC), France is the largest per capita consumer of fish within the Common Market. In France annual per capita consumption is estimated at 13.9 kilos (30.6 pounds); in Germany 10.9 kilos (24.0 pounds); Italy, Belgium, and Luxembourg 10.0 (22.0 pounds), and the Netherlands 8.9 (20.0 pounds). The French government, together with the industry, is making an effort to increase fish in the diet and increase the number of days a week on which the average Frenchman eats fish.

With the Government's assistance, fish marketing in the northeastern part of France has been organized on a prototype basis for



Fig. 6 - Herring fillets ready for packaging.

the purpose of (1) stabilizing the size of the catch in order to avoid periodic market saturation, (2) balancing more effectively the rotation of the fishing vessels, and (3) improving quality control and the manner in which fish is presented to the ultimate purchaser. It is quite probable that similar efforts will be made in other areas of France during 1966.



Fig. 7 - Packing cans with fish in a French cannery.



Fig. 8 - Attractive retail fish shop in France.

France (Contd.):

Consumption of frozen fish in France is over 15,000 metric tons a year and is expected to reach 50,000 tons a year by 1970. Fish sticks and portions account for about 45 percent of present frozen fish consumption in France. At present, frozen fish is sold in only 10,000 sales outlets in France out of a total of 200,000 retail outlets devoted to food products. This indicates the capacity for expansion. (U. S. Embassy, Paris, June 11, 1966.)



Guyana

SHRIMP EXPORTS AND VESSELS, 1965:

Shrimp is the mainstay of the Guyana¹/ fishing industry; 7,907,635 pounds were exported in 1965: over 7.6 million pounds to the United States (Guyana is said to be the third largest foreign supplier of shrimp to the United States). Value of the shipments totaled US\$5,443,876. A U. S. investor has a new \$750,000 plant and another firm has doubled its freezing capacity since 1963.



Freezing plant at Georgetown, Guyana.

About 107 shrimp trawlers operate out of Georgetown, fishing as far south as the Amazon river.

In 1965 Guyana became a participant in an FAO/United Nations Special Fund regional fisheries project. It is hoped red snapper fishing will increase as a result of training given fishermen under the project.

Local fishing is not sufficient for the market that could be developed. It is an area where small investments in vessels and equipment should bring a fair return. (U. S. Embassy, Georgetown, June 21, 1966.)

¹/Formerly British Guiana.



Japan

FISHERY LANDINGS SET RECORD IN 1965:

Japan's fish landings in 1965 reached a new record high of 6,879,000 metric tons (excluding whales), according to preliminary data released by the Statistical Research Department, Ministry of Agriculture and Forestry. The 1965 catch exceeds by 15,000 tons the peak year 1962 production of 6,864,000 tons and reverses the previous two years' downward trend. In 1964 Japan's production totaled 6,350,000 metric tons, in 1963 it was 6,698,000 tons. Compared to 1964, the sea fisheries production of 6,372,000 tons was up 9 percent, shallow seas culture production held steady at 361,000 tons, and inland fisheries and fish farming production increased 27 percent to 146,000 tons.



Fig. 1 - Packing and washing mackerel prior to stowing them in the hold aboard a Japanese fishing vessel.

Of the sea fisheries production, the trawl fisheries (mothership-type, distant-water, coastal trawl, etc.) yielded 1,913,000 metric tons, up 38,000 tons over 1964; the salmon fisheries yielded 127,000 metric tons, up 26,000 tons. Most of the increase in salmon was due to the larger catches made by the land-based salmon gill-net and long-line fisheries with a combined total catch of 81,000 tons, up 24,000 tons. The tuna fisheries was down--688,000 tons as compared to 691,000 tons in 1964, but the Atlantic tuna catch was up sharply from 1964's 69,000 tons to 83,000 tons (20 percent increase). Skipjack tuna production was up also by 10,000 tons, totaling 194,000 tons. These increases were offset by lower catches by the mothership-type, over-seas-based, and Japan-based tuna fisheries.

Squid production was up sharply at 387,000 tons, an increase of 150,000 tons. The coastal purse-seine fishery catch of 1,276,000 tons

Japan (Contd.):



Fig. 2 - Weighing black marlin aboard a Japanese tuna mothership.

showed the largest quantitative increase (264,000 tons) of all the fisheries. (Suisan Tsushin, June 8, 1966.)

FISH CATCH IS DOWN AND IMPORTS ARE UP:

The Japanese Government, at the February 22, 1966, Cabinet meeting, adopted the "1965 Annual Report on Fisheries Trends," the so-called "Fisheries White Paper," and submitted it to the National Diet. The report describes the production, economic, and management trends in the Japanese fisheries primarily for the year 1964, as well as the proposed administrative measures for the coastal fisheries in 1966. Highlights of the "White Paper" are as follows:

- (1) The fishery economy in 1964 was affected by the tight money situation, labor shortage, growing international restrictions on fisheries, and increasing imports of fishery products. However, the fishery management, while having experienced two consecutive years of decline in production, was sustained by the rising fish prices.
- (2) In 1964 fishery production (excluding whales) was valued ex-vessel at 497.5 billion yen (US\$1.38 billion). Although there was a 5.2-percent decline in production from 1963, the value increased 3 percent because of the rise in fish prices.
- (3) Owing to the production decline, the supply of edible fishery products on the domestic market in 1964 declined as follows compared with 1963: fishery products 5 percent; whale meat 8 percent; seaweed 12 percent. Domestic demand for fishery products continues to grow, and in 1964 household spending on fishery products increased 10 percent in cities and 16 percent in farm villages as compared with 1963.
- (4) Value of marine products exported in 1964 totaled 112 billion yen (\$311 million), an increase of 10 percent over 1963 but falling slightly below the high recorded in 1962. Imports of marine products in 1964 drastically increased, totaling 32.3 billion yen (\$89.7 million) in value, a gain

of 51 percent over 1963. Increase in imports of fresh, frozen and salted fish, and fish meal was particularly great.

- (5) Despite the decline in production, average earnings by the medium and small fishery enterprises in 1964 increased by 10 percent due to the rise in fish prices. Earnings for the tuna long-line fishery improved for operators of 30- to 50-ton and 100- to 200-ton vessels but declined for those operating 50- to 100-ton and 200- to 500-ton vessels due to longer trip lengths and increasing interest payments on loans.
- (6) The number of fishery managements is yearly decreasing, and by the end of 1964 there were 229,000 management units. (Note: In 1963, there were 234,000 enterprises according to the fishery census conducted by the Ministry of Agriculture and Forestry.) The number of people engaged in fisheries in 1964 totaled 612,000 persons, a 2.2-percent decrease from 1963 and a 15.4-percent decline from 1960. Owing to the outflow of youths to other industries upon graduating from school, the average age of the fishing population is yearly rising.
- (7) Average annual wage of fishermen employed in the medium and small fishery enterprises was 446,000 yen (\$1,239) in 1964, an 11-percent increase over 1963, and approximately equalled that of workers employed in the manufacturing industries. (Nihon Suisan Shimbun, February 23, 1966.)

It is also said that fishing opportunities in the world were growing tight because of the current trend toward expansion of territorial waters and other deterrents to fishing operations.

The measures introduced for the promotion of the Japanese fishing industry envisioned the development of untapped marine resources, improvement of productivity in the case of coastal fishing and small fishing interests, promotion of fish cultivation, and creation of shallow-water fishing grounds through public works, as well as increased financing for fishermen. (The Japan Times, February 23, 1966.)

FRESH AND FROZEN TUNA EXPORTS TO OVERSEAS BASES, BUSINESS YEAR 1965:

A total of 24,555 short tons of fresh and frozen tuna valued at US\$7.2 million was val-

Japanese Fresh and Frozen Tuna Validated for Export to Overseas Bases in BY 1965						
Overseas Base	BY 1965		BY 1964		BY 1963	
	Qty. 1/	Value	Qty. 1/	Value	Qty. 1/	Value
	Short Tons	US\$	Short Tons	US\$	Short Tons	US\$
American Samoa	12,501	3,756	12,457	3,609	14,563	4,083
Penang, Malaysia	6,036	1,890	3,305	890	1,552	497
Fiji Islands . . .	3,353	916	1,777	468	-	-
Saint Martin, Neth. Antilles .	1,412	368	665	211	-	-
Espiritu Santo, New Hebrides. .	1,253	304	1,226	302	2,014	503
Others	-	-	668	172	2,101	547
Total	24,555	7,234	20,098	5,652	20,230	5,630

1/Includes round and dressed tuna and fillets.

Japan (Contd.):

idated for "export" to overseas bases in business year 1965 (April 1965-March 1966), according to data released by the Japan Frozen Foods Exporters Association. This represents increases over the previous year's exports of 22 percent in quantity and 28 percent in value. (Suisan Tsushin, May 18, 1966.)

* * * * *

NEW CANNED TUNA EXPORT VALIDATION STANDARD ADOPTED:

The Japanese Ministry of International Trade and Industry (MITI), following conclusion of an exporters' agreement in April 1966 between packers and exporters on exports to the United States of canned tuna in brine, announced on May 17 the adoption of a new canned tuna export validation standard for the period May 14, 1966-March 31, 1967. Under the new standard, MITI will approve for export during the 11-month period a total of 2.54 million cases of tuna packed in brine, 70 percent to be allocated to exporters on the basis of past performance and 30 percent to be reserved as adjustment quota. Adoption of the new export validation standard resolves the 6-month long controversy between packers and exporters over canned tuna in brine exports to the United States. (Suisancho Nippo, May 18, 1966.)

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FISH LANDINGS IN YAIZU, MAY 1966:

May 1966 landings of fish at the Japanese port of Yaizu (principal tuna port) totaled 19,919 metric tons valued at 2,530 million yen (US\$7 million) as compared to April landings of 20,197 metric tons valued at 2,288 million yen (\$6.4 million), according to data compiled by the Yaizu Fishermen's Cooperative Association. Albacore landings were up slightly (187 tons) from April, but com-

Table 1 - Yaizu Fish Landings and Average Values, May 1966 with Comparisons

Species	Quantity			Average Value		
	1966		1965	1966		1965
	May	April	May	May	April	May
. (Metric Tons). . (US\$/Short Ton) .						
Tuna:						
Bluefin 1/	6,823	6,373	4,956	522	521	394
Albacore	2,834	2,647	10,272	477	376	280
Skipjack	6,825	5,293	2,706	250	265	287
Mackerel	2,698	5,234	1,858	73	88	97
Other fish	739	650	555	-	-	-
Total	19,919	20,197	20,347	-	-	-

1/Includes yellowfin and big-eyed tuna.

Table 2 - Yaizu Fish Landings and Values, January-May 1966 with Comparisons

Species	Quantity		Value	
	1966	1965	1966	1965
. (Metric Tons). . (US\$1,000). .				
Tuna:				
Bluefin 1/	31,800	28,765	16,752	10,050
Albacore	8,622	17,354	3,825	5,170
Skipjack	21,971	9,817	5,868	2,387
Mackerel	14,696	8,139	1,471	1,018
Other fish	3,637	3,287	991	818
Total	80,726	68,362	28,907	19,443

1/Includes yellowfin and big-eyed tuna.

pared to May 1965 were down 7,438 tons. The average price paid per ton of albacore (about \$477) was \$99 above the April 1966 price and \$197 above the May 1965 price. (Kanzume Nippo, June 4, 1966.)

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POLE-AND-LINE TUNA FISHING TRENDS:

On May 15, 1966, about 130 metric tons of pole-and-line albacore were landed at Yaizu. This was the first time since the beginning of the summer albacore fishery that over 100 tons of fish were landed in any one day. They sold for 170-185 yen a kilogram (US\$428-467 a short ton) ex-vessel.

Tuna Landings at Yaizu, Japan, May 1-10

Species	1966	1965	1964
. (Metric Tons)			
Skipjack	2,346	1,202	1,276
Albacore	225	1,434	489
		1/(45,000)	1/(32,000)

1/Estimated total albacore landings for season.

Note: Japanese sources earlier forecast a poor summer albacore season in 1966. The general feeling was that this year's catch will not exceed 20,000 tons, and possibly will fall far below that figure unless fishing picks up. The fishery ends in early July.

Albacore fishing was reported to have picked up in mid-May, with about 25 vessels concentrated in the area bounded by latitudes 34°-35° N. and longitudes 151°-153° E. (about 700-800 miles due east of Tokyo). The catch in that area was as high as 40-50 metric tons a day, but the fish were small, mostly averaging 3-4 kilograms (6.6-8.8 pounds).

As of mid-May, Japanese canned tuna packers were reported unable to compete for the small quantities of albacore landed by the pole-and-line fishery due to high ex-vessel prices, but were packing some skipjack, the landings of which were averaging about 200 tons a day. The skipjack were reported also to be small, less than 2 kilograms (4.4 pounds) in weight, and selling for over 80 yen

Japan (Contd.):

per kilogram (US\$202 per short ton). (Suisan Tsushin, May 19; Kanzume Nippo, May 20, 1966.)

REDUCES USE OF DECK-CARRIED TUNA-FISHING VESSELS:

It is reported that as a result of poor fishing conditions Japanese vessel owners operating portable boat-carrying tuna mother-ships are reducing the number of portable vessels carried by motherships or seeking permission to convert their vessels to regular distant-water tuna vessels. The owners of one large tuna mothership reduced the number of portable vessels from 8 to 6, while another mothership owner reduced portable vessels from 5 to 4. The somewhat lower catch of the mothership resulting from the employment of fewer deck-carried fishing vessels is said to be more than compensated for by large savings in labor costs, averaging a crew reduction of about 12 men per vessel. (Shin Suisan Shimbun Sokuho, May 11, 1966.)

REFUELING BASE IN INDIAN OCEAN PLANNED FOR TUNA LONG-LINERS:

The Japan Federation of Tuna Fishermen's Cooperative Associations (NIKKATSUREN), which is planning on sending to the Indian Ocean this year (1966) an oil tanker to service at sea the tuna long-liners operating in that ocean, is studying the possibility of establishing a refueling base in the Seychelles Islands. (Suisancho Nippo, May 18, 1966.)

FISHING AFFECTED BY MAURITANIA'S EXTENSION OF FISHING LIMITS:

The Government of Mauritania established, effective May 15, an exclusive fishery zone extending seaward 6 miles from her 6-mile territorial sea. This action by Mauritania shut out Japanese trawlers from the octopus fishing grounds off that country. Japanese trawl operators have requested their government to negotiate an agreement with Mauritania to permit their vessels to operate within the newly established fishery zone. (Nihon Suisan Shimbun, May 23, 1966.)

Note: See Commercial Fisheries Review, June 1966 p. 55.

TUNA FISHERMEN REQUEST LOWER INTEREST RATES ON GOVERNMENT LOANS:

The Japan Federation of Tuna Fishermen's Cooperative Associations (NIKKATSUREN) on April 27 held a general membership meeting to discuss NIKKATSUREN's plans for the current business year and to seek ways and means of improving management. Discussion was centered on the financial condition of the fishery, particularly on the interest rate charged for government loans to industry. The recommendation was made to seek a reduction in the current 7.5-percent rate on government loans to the fishing industry since government loans to the maritime industry are granted at 4 percent interest.

Also discussed at the meeting was the proposed transshipment of Atlantic-caught albacore to the U. S. west coast and other measures to stabilize prices, and the promotional work to expand canned tuna in oil consumption in Japan. It was decided that these matters should be further studied pending the outcome of the summer albacore fishery. However, the promotion of canned tuna in oil would be conducted on a limited scale. (Suisan Shuho, May 15, 1966.)

COMPUTER FOR IDENTIFYING TUNA SCHOOLS UNDER DEVELOPMENT:

The Japanese Fisheries Agency's Fishing Boat Research Office and the Tokai Regional Fisheries Research Laboratory are developing an electronic computer for the tuna industry which can identify species and determine sizes of fish schools. The device, to be used in conjunction with a fish finder, would analyze wave forms appearing on the finder in identifying tuna species. The first set was scheduled to be completed around September 1966, following which it will be tested at sea depths of 400-500 meters (13,000-16,400 feet). Initial production costs are estimated to be around 1 million yen (US\$2,778) a set. (Suisan Keizai Shimbun, May 13, 1966.)

SALMON LANDINGS HIGHER, PRICES LOWER THAN 1965:

Salmon fishing began on April 30 in the coastal areas of the North Pacific off Japan and in June was active both in Areas A and B. Landings of salmon in Hokkaido and in

Japan (Contd.):

the northeastern part of Honshu from fishing vessels engaged in fishing in the southern area have recently shown a large increase. Though salmon prices at first received much attention because of the big reduction in the catch quota this year, prices were staying about the same, even dropping to about 5 percent below those of last year. Pink salmon was the only exception and the price quoted was about 10 percent higher than last year.

The wholesale price at fish markets was substantially lower than last year, and it was likely that salmon would be sold at retail also at a rather low price.

In Area B south of 45° N., about 1,700 small drift-net fishing vessels were engaged in salmon fishing, and quite a number of vessels were delivering salmon to ports such as Kushiro, Akkeshi, Nemuro, Hachinoe, Miyako, and others. Most of the salmon, either salted or fresh, landed by those vessels were consumed at home.

Although at first salmon prices were expected to be fairly high because of the reduced catch quota, the wholesale prices per kilogram (2.2 lbs.) on June 1 at various ports were as follows:

Salted salmon:

410 yen (US\$1.14), about 200 yen (56¢) below last year.

Salted pink salmon:

300 yen (83¢), about 30-40 yen higher (8-11¢).

Fresh salmon:

420-428 yen (\$1.17-1.19), almost the same as last year.

Fresh pink salmon:

304-318 yen (84-88¢), 30 yen (8¢) higher.

(Extracted from Nihon Keizai Shimbun, June 2, 1966, by Fisheries Attache, United States Embassy, Tokyo, June 3, 1966.)

FIRM EXPLORES FOR ARCTIC OCEAN SALMON:

A Japanese fishing firm dispatched to the Arctic Ocean in July 1966 a 200-ton fishing

vessel, the Dairin Maru, to explore the salmon resources of that Ocean. The vessel planned to test-fish with gill nets from July to September and was mainly after chum salmon.

Japan had informed the Soviet Government at the March 1966 annual meeting of the Pacific Northwest Fisheries Commission of her intention to explore the salmon resources in the Arctic Ocean, and the U.S.S.R. had given approval to the plan. The Fisheries Agency of Japan was said to look favorably on this plan. (Nihon Suisan Shimbun, May 25, 1966.)

EXPORTS OF CANNED MACKEREL TO UNITED STATES INCREASING:

Exports to the United States of Japanese canned mackerel (natural) were reported to total as of mid-May 1966 about 190,000 cases as compared with about 80,000 cases at the end of March. The large demand in the United States this year for Japanese canned mackerel was attributed to the shortage of South African supplies and to the poor mackerel season in southern California. (Suisancho Nippo, May 18, 1966.)

EXPLORING BOTTOMFISH RESOURCE OFF EAST AFRICA:

The Fisheries Agency planned to dispatch in July the 474-ton fishing vessel Eitai Maru to explore the fishing grounds in the eastern Indian Ocean. The Eitai Maru will carry portable fishing boats, and will fish with bottom long-line gear primarily seeking bottom-fish species, such as sea bream. She was scheduled to depart Japan on July 10 and return December 10. (Shin Suisan Shimbun Sokuho, June 7, 1966.)

FISHING VESSELS LICENSED BY FISHERIES AGENCY:

Following are the fishing vessels licensed by the Japanese Fisheries Agency as of March 31, 1966 (1965 figures are in parentheses):

Offshore trawlers: 1,091 (1,111)
Trawlers west of 130° E.: 768 (779)
Pelagic trawlers: 272 (213)
Long-liners and gill-netters in the North Pacific: 19 (19)

Japan (Contd.):

Mothership-type trawlers: 241: 25 mother-ships and 216 catcher boats (228)
 Large and medium purse seiners: 635 (697)
 Large whalers: 17 (22)
 Small whalers: 22 (19)
 Mothership-type whalers: 125: 10 mother-ships and 115 catcher boats (122)
 Pelagic tuna-fishing vessels: 1,301 (1,315)
 Near-sea tuna vessels: 1,687 (1,705)
 Mothership-type tuna vessels with skiffs carried thereon: 181: 51 motherships and 130 skiffs (174)
 Mothership with catcher boat-type vessels: 168: 3 motherships and 165 catcher boats (167)
 Medium salmon drift-netters: 320 (317)
 Medium salmon long-liners: 369 (369)
 Mothership-type salmon vessels: 380: 11 motherships and 369 catcher boats (380)
 Mothership-type crab vessels: 91: 6 mother-ships, 26 catcher boats and 59 skiffs (89)

(Fisheries Attache, United States Embassy, Tokyo, from Suisancho Nippo, June 21, 1966.)

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INDUSTRY SUBMITS

RECOMMENDATIONS ON FUR SEALS:

The Japan Fisheries Society on June 18, 1966, submitted to the Government industry's views on the harvesting and processing of fur seals and related studies. The Society made the following statements and recommendations:

1. The raw seal skins Japan sent to the United States firm in 1965 for processing were found to be somewhat unsatisfactory. Every possible step must be taken in 1966 to improve fur-seal harvesting and curing methods. In 1967, the International Fur Seal Commission is scheduled to study research and development work conducted in 1965-66 to improve the quality of seal skins. The Commission's findings will have a vital bearing on the revision of the present Convention, so Japan must carefully study this matter in order to achieve her original objectives. For the 1966 annual meeting, Japan should send a group of biologists and seal-skin experts as advisors to the Government delegation.

2. Concerning research and development work, the Soviets are said to be operating a new efficient research vessel to study marine animals. It is known that the quality of skins taken at sea is superior to those taken

on land, so Japan should proceed to build a special research vessel to thoroughly study methods of harvesting fur seals with minimum damage to their skins.

The behavior of the Pribilof herd (particularly females) in recent years deserves close study. Furthermore, the investigation of the herds on the Robben and Komandorskie Islands is also lagging, so the scientists of the countries concerned should jointly undertake studies on those herds. Salmon fishing grounds should also be investigated to explore possibilities of dealing with fur-seal predation which is causing extensive damage to the salmon fishery.

3. The Japanese Agriculture and Forestry Ministry's revenue from fur seal sales since 1958, totaling around 200 million yen (US\$555,000) annually, should be spent on the forgoing research and development work as well as on the promotion of the fur-seal processing industry. (Suisan Tsushin, June 20, Suisancho Nippo, June 21, 1966.)

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GOVERNMENT TO COMPENSATE OWNERS OF SEIZED VESSELS:

On June 13, 1966, the Fisheries Agency published a list of 214 vessels seized by the Republic of South Korea that have been judged to be eligible for government compensation totaling about 2,650 million yen (US\$7.4 million). The 214 vessel owners will be compensated as follows: vessels 920 millionyen (\$2.6 million); cargo 570 million yen (\$1.6 million); administrative expenses 160 million yen (\$0.4 million); loss of fishing time 100 million yen (\$0.3 million). The 3,900 crew members that sailed on the seized vessels will receive financial assistance totaling 850 millionyen (\$2.4 million). Small and medium vessel owners and all crew members will be exempt from paying tax on their compensation. However, the major fishing companies will have to pay a partial tax. (Suisan Keizai Shimbun, June 15, 1966.)

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UTILIZATION OF SAURY IN 1965:

A survey made by the Japanese Fisheries Agency on the utilization of saury in 1965 showed that over half (56.9 percent) of the total catch of 229,694 metric tons was frozen, 17.8 percent consumed fresh, and 11.3 percent canned. Of the total of 130,784 tons of

Japan (Contd.):

Utilization of Saury in 1965, with Comparisons						
	1965		1964		1963	
	Metric Tons	%	Metric Tons	%	Metric Tons	%
Fresh	40,929	17.8	37,410	17.8	53,449	14.6
Frozen	130,784	56.9	123,359	58.8	181,953	49.9
Canned	25,926	11.3	19,837	9.6	40,262	11.0
Meal and oil .	6,846	3.0	12,470	5.9	47,069	13.1
Other ¹	25,209	11.0	16,639	7.9	41,523	11.4
Total	229,694	100.0	209,715	100.0	364,256	100.0
¹ /Processed and used as food, e.g., salted, dried.						

frozen saury, about one-third is expected to be consumed as bait by the tuna long-line fishery. (Suisan Tsushin, June 15, 1966, and other sources.)

* * * * *

WHALING IN

EAST CHINA SEA REACTIVATED:

A large Japanese fishing company has recommenced whaling operations in the Goto Islands in the East China Sea. The firm has assigned to the operation the 430-ton whaler Fumi Maru No. 5. On June 15 the Fumi Maru was reported to have landed her first fin whale. Another firm which had also until last year engaged in the Goto Islands whale fishery apparently does not plan on reentering the fishery. (Suisan Tsushin, June 21, 1966.)



North Korea

SOVIET-NORTH KOREAN

FISHERIES COMMISSION MEETS:

The 17th session of the Korean-Soviet Commission on Scientific and Technical Cooperation in Fisheries took place in Pyongyang, North Korea, May 10-17, 1966. The Soviet delegation was headed by Minister of Fisheries A. A. Ishkov. The agenda of the 1966 meeting of this Commission is not known.

The Soviet-Korean Commission must not be confused with the multilateral Western Pacific Fisheries Commission of which both North Korea and the U.S.S.R. are members. Included in the latter Commission are Communist China, North Vietnam, and Mongolia; it was formed only 11 years ago.



Republic of Korea

REFRIGERATED TUNA VESSELS
ASSIGNED TO AMERICAN SAMOA:

The Republic of South Korea assigned to American Samoa in April, 6 new 180-ton refrigerated tuna long-line vessels. Reportedly, this is the first case of countries other than Japan employing refrigerated tuna vessels out of Samoa. Japan was the first to employ them (in place of ice boats) and their use is expected to become more widespread. (Nihon Suisan Shimbum, June 1, 1966.)



Libya

FISHING VESSELS

ORDERED FROM POLAND:

Polish shipyards have orders from Libyan owners for 33 small fishing vessels designed to fish in the Mediterranean. Included are two training and research vessels. Delivery is scheduled for the end of 1967. No details on specifications or financing arrangements are known.



Malaysia

SURVEY OF MARINE

FISHERY RESOURCES IN

COOPERATION WITH THAILAND:

The Malaysian Minister of Agriculture and Cooperatives announced on May 24, 1966, that Thailand has agreed to join Malaysia in a research survey of fishing resources in waters surrounding Malaysia. The survey, which is to be completed before the northeast monsoon begins late this year, will be carried out in three stages: (1) a six-week survey in waters between Songkla and southern Johore, (2) a survey along the east coast of Malaya, and (3) a survey in waters around Sabah and Sarawak.

The intent of the survey is to identify unexploited fishery resources. By developing new fishing grounds, the Minister hopes to increase Malaysia's annual marine catch (215,000 metric tons) by 100,000 tons.

The Minister also announced that the Malaysian Government is considering the purchase from Thailand of 1 or 2 90-ton fishery

Malaysia (Contd.):

research vessels. Costing about M\$150,000 each, the vessels will come equipped with echo-sounders and wireless sets. (U.S. Embassy, Kuala Lumpur, June 7, 1966.)

Editor's Note: Hopefully, the survey will help relieve the tension between trawlermen and inshore fishermen. The location of unexploited fishing grounds, which could be designated for trawling, would reduce the temptation for trawlermen to poach on inshore grounds inside the 12-mile, 15-fathom limit. On May 29, marine police used tear gas to disperse 500 inshore fishermen who had mobilized for another naval battle with Pangkor Island trawlermen who were reportedly violating the limit.

It remains to be seen whether improved relations with Indonesia will also help relieve tension. Repeated Indonesian attacks on fishing boats have made Malaysian trawlermen reluctant to fish more than a few miles off the Malaysian coast.



Mexico

SHRIMP TRENDS, FIRST QUARTER 1966:

Shrimp landings during the first quarter of 1966 were up somewhat over the same period of 1965, according to preliminary data of the Mexican Department of Fisheries. The total catch of January-March 1966 for the 9 principal shrimp ports was 7,046,960 kilograms (15,503,300 pounds), compared to 6,754,000 kilograms (14,858,800 lbs.) in 1965.



Fig. 1 - Mazatlan, Sinaloa, Mexico. Entrance to harbor.



Fig. 2 - Shrimp trawlers and freezing plants at Guaymas, Sonora. (Data are based on shrimp as landed--heads-on, heads-off, etc.)

The Pacific Coast fishery reversed the downward trend of the past several years, with a substantial increase in catch. In 1966, catches were 4,892,869 kilograms (10,964,300 pounds), compared to 4,129,336 kilograms (9,084,500 pounds) the preceding year.

Four Pacific Coast ports showed large increases. One port showed a slight increase, but Salina Cruz experienced a sharp drop (table 1).

Table 1 - Mexico's Principal Pacific Coast Ports Show Increased Shrimp Landings, First Quarter 1966 and 1965

Port	First Quarter			
	1966	1965	1966	1965
	(1,000 Kilos)		(1,000 Lbs.)	
Mazatlan	1,979	1,670	4,354	3,674
Guaymas	1,417	926	3,117	2,037
Puerto Penasco	396	287	871	631
San Felipe	115	31	253	68
Topolobampo	286	273	629	601
Salina Cruz	700	941	1,540	2,070

The fishery in the Gulf of Mexico, which had been on the increase for several years, suffered a setback. Production in 1966 was 2,154,091 kilograms (4.7 million pounds), compared to 2,624,664 kilos (5.8 million pounds) the preceding year.

The two principal Gulf ports had smaller production (table 2) whereas Tampico had a small increase.

Neither governmental nor industry statistics specify species nor size of shrimp.

In general, there are no ex-vessel prices in Mexico. Shrimp are delivered to proc-

Mexico (Contd.):

Table 2 - Mexico's Principal Gulf Ports Show Lower Shrimp Landings, First Quarter 1966 and 1965

Port	First Quarter			
	1966	1965	1966	1965
	. (1,000 Kilos).		. (1,000 Lbs.).	
Ciudad del Carmen	1,383	1,580	3,043	3,476
Campeche	613	894	1,349	1,967
Tampico	158	151	348	332

essing plants on consignment and vessels share whatever the eventual sales price may be on the United States market. Part payment is made at time of unloading pending final settlement.

No data are available on processed products. All shrimp for export is frozen either as heads-off shelled, or peeled individually frozen, butterfly, with a small quantity breaded.

As customary, virtually all exports are to the United States. Because shrimp exports to the United States are such an important part of Mexican foreign trade, the Department of Statistics of the Secretariat of Industry and Commerce includes them in its "Principal Economic Indicators." According to its recent preliminary figures, shrimp exports during the first quarter of 1966 were valued at 119.9 million pesos (US\$9.6 million), up 16.5 percent from 1965's 102.8 million, (US\$8.23 million), which in turn was down 25.5 percent from 1964 when they were valued at 137.9 million (US\$11 million).



Fig. 3 - A few of Ciudad del Carmen's 250 shrimp trawlers.

The marketing situation early in 1966 was good as far as the producers are concerned. Prices and demand were at high levels in both the United States and Mexico. Producers are looking forward to moving all the shrimp they can obtain in the foreseeable future.

The most encouraging trend is the improvement of catches in the northern part of the Pacific Coast, which is by far the greatest producing area and where the largest decline has taken place in recent years.

After several years of overbuilding, followed by a decline in production accompanied by continual strife between boat owners and crews, the construction of new vessels (except for export) virtually ceased. Hence, the fleet as a whole is becoming obsolete as compared to the fleets of other countries that are competing for the United States market. Generally speaking, the older

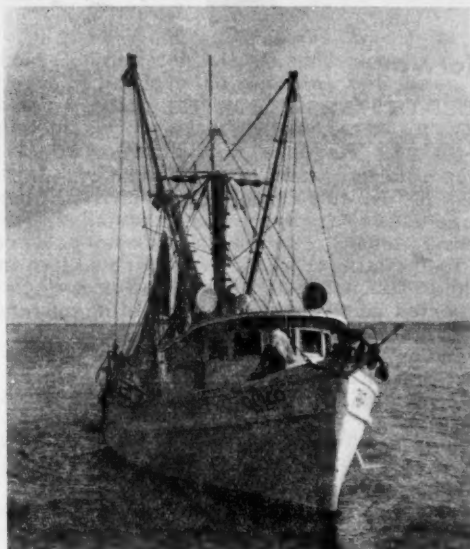


Fig. 4 - Close-up of typical shrimp trawler operating out of Ciudad del Carmen.

Mexican vessels are not capable of fishing in deep water and hence cannot expand the present grounds. Without new replacements the fleet cannot be expected to increase production. However, a few new vessels are now under construction in Gulf ports, and the National Bank for the Development of Cooperatives is about to build ten very large vessels for deep-water trawling in an effort to convert its pilot fishing port at Alvarado into a shrimp port. These developments should maintain catches in Gulf of Mexico waters at a maximum level. (Regional Fisheries Attache, U. S. Embassy, Mexico, June 25, 1966.)

FISHING LIMIT OF 12 MILES PROPOSED:

The President of Mexico is said to have proposed that a law be formulated for sub-

Mexico (Contd.):

mission to the Mexican Congress during the next session, fixing Mexico's exclusive fishing zone to 12 miles. Mexico now unilaterally claims fisheries jurisdiction up to 9 miles off the Mexican coast. (U. S. Embassy, Mexico, May 27, 1966.)



Norway

SEED OYSTERS EXPORTED TO FRANCE AND DENMARK:

In the spring of 1966, a shipment of 24 tons of seed oysters was exported by a Norwegian firm to France. Three charter planes were used to carry the oysters from Vigra near Aalesund to France. The oysters were of the planting type and were carried live in plastic fish boxes. Previously Norway has exported large quantities of planting oysters to Denmark. Natural conditions for oyster breeding in Norway yield a grade of oyster spat that is hardy and adaptable to temperature fluctuations. (The Export Council of Norway.)



Peru

BANNER YEAR FOR FISH MEAL PRODUCTION:

The 1965/66 season wound up in May as a banner year for fish meal, confounding the earlier predictions of scientists that the anchovy catch would be small in tonnage and

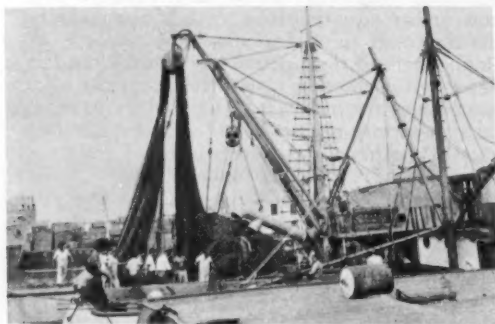


Fig. 1 - Using a power block to re-pile a purse-seine net aboard a Peruvian anchovy vessel.

poor in quality. The 9-month season produced almost 1.4 million metric tons of fish meal and left the industry with over half a million tons of inventory, more than enough to carry through until fishing resumes in



Fig. 2 - Sacks of fish meal curing for export. Meal is stored outdoors because it never rains.

September. During the first 5 months of 1966, the industry produced over 960,000 tons of meal, an extraordinary total far outstripping any comparable period on record. (U.S. Embassy, Lima, July 3, 1966.)

Note: See *Commercial Fisheries Review*, July 1966 p. 87, June 1966 p. 82, May 1966 p. 65, April 1966 p. 66, February 1966 p. 79, January 1966 p. 90.



Poland

NEW CLASS OF STERN FACTORY TRAWLERS TO BE BUILT BY 1967:

The Gdansk Shipyard has started building a new B-22 class factory stern trawler for Polish fisheries. When designing the new trawler, experience gained in operating the B-15 and B-26 trawlers was taken into account.

The trawler will fish in distant sub-Arctic fishing grounds of the northwest Atlantic. The stern fishing gear will be adapted to catch at great depths (up to 1,000 meters, 3,280 feet), as well as for pelagic fishing. The fish caught will be processed into frozen fish fillets in blocks, frozen fish in blocks, fish meal, and fish oil.

The main characteristics of the new B-22 class trawler are:

Length between perpendiculars	80.0 meters (262.4 feet)
Breadth	14.5 meters (47.6 feet)
Depth moulded	9.75 meters (32.0 feet)
Deadweight capacity	1,500 tons
Gross registered tonnage	2,700 tons

Poland (Contd.):

Capacity of reefer holds	1,530 cubic meters (54,025 cubic feet)
Capacity of fish meal holds	435 cubic meters (17,360 cubic feet)
Capacity of oil tanks	60 cubic meters (2,119 cubic feet)
Endurance	90 days
Main engine output	2,500 hp.
Speed (at trials)	13.8 knots
Crew	103 persons

The vessel's propulsion system will comprise main engine driving a controllable-pitch propeller through reduction gear. Two generators will be coupled to the transmission gear. Apart from these, in the engineroom there will be two separate generating sets.

The trawler will have one wheelhouse for the conduct of both navigational and fishing operations. Remote control of the controllable-pitch propeller and trawl winch from the wheelhouse will be provided.

The electric trawl winch will have a pulling capacity of 12.5 tons at a rope-heaving speed of 110 meters or 361 feet per minute. The operations connected with hoisting the cod end on deck will be mechanized to a large extent.

The processing and freezing capacity will be 70 metric tons per day.

The mechanized fish-filleting lines will include: a large cod-processing line, a small cod-processing line, and an ocean perch or redfish-processing line.

Frozen products will be stored in holds at a temperature of 25° C. (-13° F.), in holds situated on both sides of the engineroom.

The fish-meal plant's capacity will be 35 metric tons per day. In special boilers, technical or medicinal liver oils will be manufactured from cod livers.

The prototype unit in the series of the new factory trawlers will be handed over to Polish owners in 1967. (Polish Maritime News.)

FISHERIES ATTACHE IN EAST BERLIN:

The former Director of the Gdynia Sea Fisheries Institute is scheduled to become Polish Fisheries Attache in East Berlin. He will be replaced by a technologist who was

formerly a professor in the Technological Division of the Fisheries Department of the Higher Agricultural School. The establishment of a fisheries attache position in East Germany is apparently recent and was made in connection with the 1962 Tripartite Agreement on Fisheries Cooperation concluded between the U.S.S.R., Poland, and East Germany (Bulgaria acceded in 1964, Rumania in 1966).

The Agreement, administered by a Joint Mixed Commission, stipulates a close collaboration between the signatory powers in fishery research, fisheries technology, and development of joint high-seas operations. The Commission also forecasts fish stocks in the Northwest Atlantic (ICNAF) and coordinates fishery research there. In addition to a fisheries attache in East Berlin, Poland has a similar position in Moscow, U.S.S.R., and Accra, Ghana. (U.S. Embassy, Copenhagen, June 20, 1966, and other sources.)



Portugal

TUNA FISHERY DEVELOPMENT
PLANS FOR CAPE VERDE ISLANDS:

To promote Cape Verde Island fisheries, especially tuna fisheries, the Portuguese Government announced a contract with the Portuguese firm which is expanding its cold-storage facilities at São Vicente. In essence, the Portuguese Ministry of Overseas agreed to provide the firm with about US\$1 million to build modern port facilities for use by the Cape Verde fishing industry.

Portugal had previously announced that West Germany had agreed to (1) provide two technicians to make a 6-months tuna survey off the Cape Verde Islands, and (2) help Portugal transform a vessel into a modern live-bait tuna-fishing vessel.

Note: See Commercial Fisheries Review, July 1966 p. 89.



Saint Pierre-Et. Miquelon

POLISH VESSELS LANDFROZEN PACKED FISH AT SAINT PIERRE:

Polish fishing vessels use the port of Saint Pierre, a French possession south of Newfoundland, to transship their frozen pack-

Saint Pierre-Et Miquelon (Contd.):

aged fish to the United States. Traffic was especially active in the winter of 1964 and early spring of 1965 when a number of Polish fishing vessels anchored at this Common Market port. Most of the packaged fish was frozen cod, and some of it also went to Canada. (Canadian Fisherman.)

Editor's Note: During 1965 at least 10 fishing nations used the port of Saint Pierre. The Spanish vessels were most frequent visitors; Portuguese, Norwegian, Danish, Japanese, and Venezuelan vessels visited the port. To accommodate the increased traffic, a new fishing harbor is being completed at Saint Pierre, and negotiations are underway to obtain the necessary capital to build a large fish factory near the new fishing port.



South Africa

FISHING SEASONS CHANGED:

Changes in the fishing seasons for spiny lobster and for pelagic species of fish were announced by the Division of Sea Fisheries of South Africa. The lobster season along the west coast will be closed from June 1 to September 30 each year (previously September and October only). The open season for smaller fish, such as sardines, mackerel, and maasbankers, was extended to eight months, January 1 to August 31. (This season previously closed on July 1, with extensions in recent years for anchovies only.) (United States Embassy, Pretoria, June 7, 1966.)

FISHING TRENDS, MAY 1966:

Fish Meal and Fish Oil: Good catches were reported during May, with the only limiting factor on occasions being the weather conditions. At Walvis Bay, South-West Africa, the last of the factories commenced operations and fairly heavy catches were landed. Cape operations were confined in the main to meal and oil production, owing to the unsuitability of the fish for canning purposes; at Walvis Bay, however, production included all the major products. The industry is now fully committed for the current year in accordance with sales programs, which have been based upon forecasts of likely availability.

Fish meal and fish oil prices on the world market tended to decline somewhat in May, owing mainly to continued heavy production in Peru. In view of the global availability of these products tending to equate generally with demand, no great fluctuations in price are anticipated, however.

Spiny Lobster: May spiny lobster operations reflected little change from the late March and early April pattern. Shipments were maintained to all markets at price levels which remained constant, despite the prevailing easier tone in the United States. Catching was affected to some extent by the heavy snoek runs which annually attract the attention of some fishermen.

Vema Seamount: Early in 1966, it was reported that the Division of Sea Fisheries was undertaking a scientific investigation of the lobster population around Vema Seamount. This area, some 16 square miles in extent, attracted an intensive concentration of fishing operations after the occurrence of a prolific lobster population on the summit zone of the Mount was discovered towards the end of 1964. After initial heavy catches, signs of rapid and early depletion soon became evident.

It was ascertained that the composition as such of the lobster population around Vema Seamount had not revealed any marked change. This conclusion was arrived at after a comparative examination of the average sizes of a fairly representative cross section of individual lobsters sampled before and after the period of exploitation. According to the survey, the decline in the availability of lobsters in this area may be attributable, therefore, in no small measure to a decrease in numerical strength. A further lack of availability may be, the report suggests, the possibility that the abundance of plant life around the rocky slopes of the Mount made baiting difficult. Malpractices of fishermen, moreover, could also have contributed to declining catches. Excessive dumping of lobster offal, for example (only the tail of each lobster is utilized, the remainder--some 60 percent of the total weight--is thrown overboard), was found to have not only a toxic effect on lobsters themselves but also a contaminating influence on supporting fauna and flora.

The possibility of, and probable length of time involved before the lobster population

South Africa (Contd.):

could be expected to recover, received close examination. It may be possible that floating larval colonies will be drawn from the lobster colonies occurring in the Tristan de Cunha area (which are composed of a species identical to that forming the colonies around Vema Seamount) by the South Atlantic Gyral current system; on the other hand, distances are great and migrating life is subject to the vagaries of the current.

Judging by the population growth on Tristan de Cunha, however, the lobster species concerned has a slow growth and, therefore, also rate of increase. (Barclays Trade Review, June 1966.)

EXPORTS OF LIVE

SPINY LOBSTERS INCREASE:

South Africa's exports of live spiny lobster in 1965 were almost 10 times bigger than in the previous year, and after the first four months of 1966 it was indicated that last year's record would be surpassed within the next two months, an official of the Cape Lobster Exporters' Association in Cape Town said on May 13, 1966.

The exports of frozen whole lobster showed an even bigger increase in 1965, compared with the previous year (3,356 lbs. to 128,758 lbs.). France is by far the biggest customer for South African live spiny lobster, although exports to many other parts of the Continent and Britain are increasing rapidly. South Africa exported 35,128 lbs. of live lobsters in 1964, 349,128 lbs. in 1965, and 229,703 lbs. for the first four months of 1966. (United States Embassy, Pretoria, June 7, 1966.)

CANNED PILCHARDS HAVE
LOCAL MARKET BOOM:

The South African pilchard-canning industry is experiencing a boom, with home market sales having doubled in the last three years, from 625,000 cartons to 1,250,000 cartons in 1965. A further 20-percent increase in sales this year to around 1,500,000 cartons is expected.

For many years dependent on fluctuating export markets for the bulk of its revenue,

the industry is now finding a much more stable base in the rapidly-expanding home market.

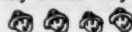
The Director of Federal Marine, the fish-canning industry's sales organization, gives the low price of the product and the growing consumption of canned fish by the Bantu as reasons for the upsurge in local sales. As the basic price of canned pilchards has not risen for 18 years, they represent very good value for the money.

The favorable prognosis for local sales will only partially compensate the industry for the loss of the anticipated Philippine market, in the wake of a decision by the Philippine Government to prohibit further purchases of South African canned pilchards. Previous sales to the National Marketing Corporation of the Philippines had amounted to over 700,000 cases annually. (South African Digest, Pretoria, June 3, and United States Embassy, Pretoria, July 7, 1966.)

FISHING INDUSTRY SEEKS
GOVERNMENT CONTROLS
ON FOREIGN OPERATIONS:

Four major South African fishing firms reportedly plan to seek South African Government action to control the activities of foreign fishing firms off South African waters. They will ask the Government to impose restrictions on the use of South African harbors by foreign firms and to require owners of foreign trawlers to pay customs duty on fish in cold storage, particularly in Cape Town. In addition, they will urge the Government to call an international conference to protect fish stocks in the Atlantic, and particularly around South Africa.

According to an industry representative, the South African problem is twofold: one of long-term preservation of fishing grounds and one of meeting foreign fishing competition. The press recalls Minister Diederich's statements to the recent conference in Cape Town of the International Association of Fishmeal Manufacturers. These statements dealt with the threat to South Africa's fishing industry posed by the extensive operations of foreign fishing interests, and called for observance by the respective foreign governments and interests of proper conservation measures. (United States Embassy, Pretoria, June 21, 1966.)



South-West Africa

FISHING TRENDS, MAY 1966:

During May, fish were plentiful, and abundant catches were being taken not far out from Walvis Bay. Shoals were found within 1 to 1-1/2 hours sailing from the jetties, or about 8 to 12 miles offshore.

The general condition of the fish was described as very good and oil yield amounted to about 17 gallons per ton of fish.

As a result of a major boiler-breakdown at the Walvis Bay power station, processing factories were forced to curtail production.

Production of fish meal, fish oil, and canned fish during February and March 1966 was:

Product	1966	
	February	March
Fish meal (short tons)	9,083	16,649
Fish oil (long tons)	1,463	2,488
Canned fish (lbs.)	4,472,317	12,304,782

Production and export figures for frozen spiny lobster tails and canned lobster meat through Luderitz during April 1966 were:

Product	Weight	Value
	Lbs.	US\$
Spiny lobster tails, frozen	521,000	1,039,000
Spiny lobster meat, canned	31,800	34,000

(Barclays Trade Review, June 1966.)

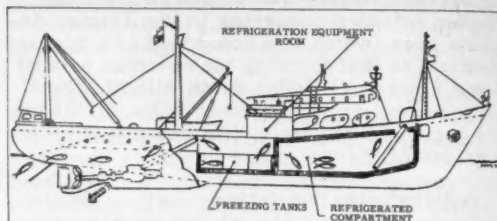


Spain

AUTOMATED TUNA VESSEL BEING BUILT:

The tuna purse-seiner *Sarasua* under construction in a Spanish shipyard is being equipped with an automated system for loading the catch and for freezing and storing the fish in an "assembly-line" operation. The system provides for a purse-seine filled with tuna to be coupled to an opening in the stern of the vessel below the waterline. An inflowing current is then created by the ship's two turbine engines to draw the fish into the vessel. As the water is expelled from the receiving tank through a second opening in the direction of the seine, the force of the outgoing current floats the net and prevents it from becoming fouled in the ship's propeller. The fish are emptied from the stern compartment into adjoining freezer tanks amidships by means of a conveyor belt. Once frozen, the fish are conveyed to a forward storage com-

partment which is also equipped with a conveyor belt for unloading the catch. Using this system the owners expect efficient operations with a substantially reduced crew.



Schematic drawing showing planned "assembly-line" operation of the *Sarasua*.

The *Sarasua's* 6 freezer tanks will have a freezing capacity of 100 tons of tuna a day. Capacity of the storage compartment is 1,000 cubic meters, with a temperature of -20°C. (U.S. Consul, Bilbao, June 15, 1966.)



Tanzania

FISHERY AID FROM U.S.S.R.:

On May 26, the Tanzanian Finance Minister Jamal signed an aid agreement with the Soviet Union during his visit to Moscow. The credits, amounting to 18 million rubles (about US\$20 million), were provided in an agreement reached in August 1964. Soviet credits will finance (among other projects) a fish-drying plant, 4 cold-storage plants, and fishing gear and equipment for both the Mainland and the Island of Zanzibar. Two of the cold-storage plants for keeping frozen fish will be located on Zanzibar and 2 on the Mainland. The loan will be repaid over a period of 12 years at 2½ percent interest. The Soviets will use the loan payment moneys for the purchase of Tanzanian products. (U.S. Embassy, Moscow, June 10, 1966.)



Togo

FISHERIES DEVELOPMENT:

Continued German aid to Togo's modest ocean fishing industry bodes well for its future. In 1965, a cold-storage room, smoking and drying facilities, and related installations were completed with German assistance. A store equipped to sell fishing gear and boat supplies to fishing cooperatives was

Togo (Contd.):

established. Several German advisors are working with the Service de Pêche, and one of the long-awaited German fishing trawlers was finally delivered to Togo in early 1966. Small fishing vessels are now able to anchor in the lee of Togo's new port thus securing protection from the open sea.

A small Peace Corps inland fisheries project to alternate raising fish and rice in ponds supplied by dammed rain water progressed well in three locations in the north. Several pond systems were built, dams were improved, and both products were successfully harvested on a small scale. A related river fishing project by one volunteer has also registered success in terms of increased catches.

Construction continued throughout 1965 on Togo's new German-financed deep-water port, a few miles east of Lomé. The principal jetty is nearing completion, and work has begun on the pier and related installations. The port will probably be ready to handle its first ships toward the middle of 1967, several months ahead of schedule.

Togo's Fish Imports, 1965				
	1964		1965	
	Value US\$ 1,000	Qty. Metric Tons	Value US\$ 1,000	Qty. Metric Tons
Fresh Fish,	11.5	66.6	109.4	693.6
Frozen or chilled fish,	538.7	3,192.9	630.2	4,096.7
Dry, smoked, or salted fish, . .	295.1	905.2	354.7	1,002.2
Total,	845.3	4,164.7	1,094.3	5,792.5

Togo imported more fish in 1965 than in the previous year, and its fish exports dropped from 44.8 tons in 1964 to an insignificant 7.6 tons, worth 559,000 CFA francs (US\$2,282) in 1965. Increased local consumption and more clandestine re-exports (principally to Ghana) probably account for both developments. (United States Embassy, Lomé, May 17, 1966.)



Uganda

FISHERIES AID FROM ISRAEL:

Between 1962 and 1965 Israel sponsored three courses for fisheries officers. Six Ugandans attended a three-month course in February 1964 and an additional 5 fisheries assistants attended a similar course in June 1965. The subjects covered shore and lake fishing, construction and repairing of nets, construction of boats, sailing and navigation.

During their stay in Israel, the students visited fishing centers and artificial fish ponds. (United States Embassy, Kampala, June 29, 1966.)



U. S. S. R.

FLOUNDER FISHERY OFF KURILE ISLANDS:

In early June 1966, a Soviet fishing expedition began catching flounders off the South Kurile Islands. Soviet Pacific flounder catches have decreased markedly during the last three years. This was partially due to poor flounder catches in the eastern Bering Sea and a depletion of stocks off Kamchatka.

PACIFIC HAKE UTILIZATION:

The first deliveries of Pacific hake caught by Soviet fishing vessels off the Pacific Northwest had begun to arrive in the Siberian mainland in June 1966. Some hake is being sold in fish stores in Iuzho Sakhalinsk on Sakhalin Island. The Far Eastern Fisheries Administration is exploring new ways of using hake for human consumption and dishes prepared from Pacific hake were tested. Included were hake soup, hake cutlets, hake fillets in tomato sauce, fried hake with marinated sauce, hake loaf, and others.

DELIVERIES OF HERRING TO JAPANESE ON THE HIGH SEAS:

The Hokkaido Island Federation of Fishery Unions has made a contract with the Soviet Far Eastern Foreign Trade Office (DALINTORG) for the delivery of 5,000 metric tons of round herring to two Japanese herring motherships operating in the northern sea of Okhotsk. Despite occasional difficulties between the Japanese and Soviet fishermen, the relations between the Soviets and Japanese are taking a turn for the better. Increasing fishery trade between Soviet Far Eastern Regions and Japan's Northern Provinces plays a large role in this rapprochement. Ishkov's visit to Tokyo, which will deal mainly with (1) the problems of insuring safe Japanese operations near the Soviet coasts and (2) technical cooperation, presumably will further improve the U.S.S.R.-Japanese fishery relations.

Note: See Commercial Fisheries Review, May 1966, p. 55.

U.S.S.R. (Contd.):

PACIFIC FISHING FLEET ADDITIONS:

By 1970, the Far Eastern Fisheries Administration at Vladivostok plans to buy 40 large factory stern trawlers for its Pacific fisheries. This will more than double the number of large stern trawlers operating in the Pacific Ocean and the Bering Sea as of June 1966. How many of these new stern trawlers fish off U.S. coasts will depend on the pace with which the U.S.S.R. develops fishing grounds elsewhere in the Pacific and Indian Oceans. During the latter part of 1965 and early part of 1966, the Pacific Research Institute of Marine Fisheries and Oceanography (TINRO) sent 3 fishery research expeditions to explore various Pacific areas: the Continental Shelf off Mexico; probably off western South America; off Australia, New Zealand; and elsewhere in the South Pacific as well as in the Indian Ocean. Almost 20 fishery research and exploratory vessels have been engaged in these expeditions--the largest number ever employed under a single Soviet fishery research program. The results are not yet known, but on the success or failure of these explorations will largely depend how intensive the Soviet fishing effort off United States Pacific shores in the future will be.

A pattern of Soviet fishing operations is emerging. The Soviets have developed the capability to capture and utilize a diversity of marine species in distant waters, and will undoubtedly continue to search out and develop new resources. This expansion into virgin grounds and little exploited resources will continue for several years to come, with concomitant additions to the Soviet fleet of larger vessels of broad range and great fishing capability. The pattern appears to involve intensive fleet concentration on a single species on one ground for relatively short periods. It results in a temporary increase of average landings. When fishing drops off, fleet effort is then diverted to the same species elsewhere, or to other species in the same general area. This does not preclude exploitation of the first species on the original grounds at some future date should the stocks rebuild.

FAR EASTERN FISHERIES RECEIVE TWO NEW FACTORY STERN TRAWLERS:

At the end of May, the Kamchatka Fisheries Administration received two new large

factory freezer stern trawlers constructed in the Nikolaev-on-the-Black-Sea Shipyards. Both are about 3,200 gross tons, Maiakovskii class. One of them, the Voskhod, made a call at the port of Burgas, Bulgaria, where it loaded lumber for Cuba. In Cuba it picked up sugar for the U.S.S.R., which it will unload in Kamchatka prior to engaging in fishing in the North Pacific. The second trawler, the Trudovie Rezervy, was brought to Kamchatka by a Leningrad fishing captain. (Kamchatskaia Pravda, May 30, 1966.)

Editor's Note: These additions to the Kamchatka fleet are the first of the 12 new stern trawlers that will be delivered to Kamchatka by 1970. Another trawler was delivered to the Sakhalin Fisheries Administration in mid-April 1966. With the new additions, the U.S.S.R. now operates 38 large factory stern trawlers from its Far Eastern fishing ports. In 1959, the U.S.S.R. had only one large stern trawler in the Pacific. Soviets will most likely use these factory trawlers in the ocean perch and other bottomfish operations off United States coasts. Other additions will be used in expanding Soviet Pacific fisheries.

NEW OCEANOGRAPHIC VESSEL:

During the second International Oceanographic Congress held in Moscow, the Soviets described to the Congress participants an oceanographic vessel recently built in East Germany for the Soviet Union. The Akademik Kurchatov, constructed at the Mathias-Thesau shipyard in Wismar, is a 370-foot vessel, has a 6,680-ton displacement, and is manned by a crew of 84. The ship has 22 research laboratories, will accommodate 84 scientists and technicians, and is equipped with a helicopter. The Akademik Kurchatov is the world's largest oceanographic vessel, and is assigned to the Institute of Oceanography of the Soviet Academy of Sciences.

The first cruise of this research vessel will probably take place in the Atlantic Ocean where, with the U.S.S.R. oceanographic vessel Vitiaz, geophysical research will be carried out. A group of East German oceanographers has been invited to participate on this cruise.

The East German shipyard has an order for 2 more similar oceanographic vessels for the U.S.S.R. to be delivered in the next few years. (U.S. Embassy, Moscow, June 10, 1966.)

U.S.S.R. (Contd.):

EXPLORATORY FISHING IN NORTHERN BERING SEA:

The fisheries research vessel Kalmar of the Pacific Scientific Research Institute for Fisheries and Oceanography (TINRO) sailed on a research cruise to the Northern Bering Sea from her home port of Vladivostok at the end of June 1966. During the 4-month expedition, the TINRO scientists will study the possibility of developing commercial fisheries north of St. Lawrence Island in the northern Bering Sea to follow closely behind Japanese interest.

FISHERY RESEARCH IN THE PACIFIC:

The Soviet oceanographic research vessel Voieikov began its 16th scientific cruise in mid-June 1966. In addition to hydrological investigations, research on fishery resources of the Pacific will also be conducted; the emphasis will be on whale and saury resources. Voieikov has conducted extensive research in the northeastern Pacific in the past (she was off United States and Canadian coasts in 1965 with the Shokalskii and 2 other hydrographic vessels). As far as we know, however, this is the first time that these vessels will also conduct fishery research.

SAURY RESEARCH OFF U.S. COASTS:

The scientific fishery research vessel Ogon departed the home port of Vladivostok early June 1966 for an exploratory-research cruise that will last seven months and include the area from Vancouver Island to Mexico. She will first operate with the ocean perch fishing fleet off Vancouver Island. (It was the Ogon that in 1965 found large concentrations of ocean perch in that area.) The real purpose of her cruise is to confirm the occurrence of large concentrations of saury which she found around the 40th parallel last year.

OCEANOGRAPHIC RESEARCH VESSEL ENDS ATLANTIC STUDIES:

The Soviet oceanographic research vessel Mikhail Lomonosov returned to her home port of Sevastopol on January 12, 1966, after a 3-month voyage in the Northeastern Atlantic and the Norwegian Sea. The vessel, which has a displacement of over 6,000 tons,

carried a team of 130 scientists (including 12 women) and was equipped with 16 modern laboratories. The Marine Hydrological Institute of the Ukrainian Academy of Sciences operates the vessel. During the trip the scientific party studied the formation of radioactive fields in the Northwestern Atlantic and came to the conclusion that in view of strong currents and intensive water exchange the Northwest Atlantic must be closed to radioactive waste disposal. The expedition also studied the directions of known currents with the use of an electronic computer installed on board the vessel.

Editor's Note: The Mikhail Lomonosov, the largest Soviet oceanographic vessel, has been in the forefront of Soviet oceanographic efforts for several years. During 1964-1965, she participated in the First Joint Soviet-Cuban Fishery and Oceanography Research Expedition in the Gulf of Mexico and the Caribbean Sea.



United Arab Republic

JOINT FISHERY RESEARCH WITH U.S.S.R.:

The Soviet Union and the United Arab Republic have concluded an agreement for joint fishery research in the southern part of the Mediterranean near the Egyptian coast. This scientific survey will begin in January 1966, and last one year. Participating will be eight Soviet and five Egyptian biologists and oceanographers aboard a Soviet vessel. The principal purpose of the survey is the discovery of new marine resources and the study of fish concentrations, and their food patterns.



United Kingdom

SUPPLY AND DISPOSITION OF FROZEN PROCESSED WHITE FISH, 1953-1965:

British production of frozen processed white fish has about doubled during the last 10 years, but domestic consumption has increased at an even faster rate. Domestic output has been insufficient to satisfy domestic consumption since 1960, and in 1965 imports made up about 30 percent of the British supply of frozen processed white fish.

United Kingdom (Contd.):

Table 1 - British Frozen Processed White Fish Disposition, 1953-1965						
Year	Home Market			Exports ^{1/}		
	Total Home Market	Bulk or Int'l Packs	Consumer Packs	Total Exports	Bulk or Int'l Packs	Consumer Packs
			(Long Tons)			
1965	82,000	44,923	37,877	15,970	9,321	6,649
1964	80,053	42,660	37,393	11,442	7,293	4,149
1963	73,901	39,153	34,748	11,388	7,385	4,003
1962	63,186	34,809	28,377	8,773	5,872	2,901
1961	62,428	33,557	28,871	8,204	6,118	2,086
1960	57,391	30,409	26,982	8,475	6,375	2,100
1959	41,341	20,588	20,753	9,591	7,545	2,046
1958	35,131	19,919	15,212	12,030	10,453	1,577
1957	30,336	18,485	11,851	7,398	6,024	1,374
1956	32,527	2/	2/	7,567	2/	2/
1955	22,914	2/	2/	8,834	2/	2/
1954	17,320	2/	2/	8,008	2/	2/
1953	10,634	2/	2/	3,410	2/	2/

^{1/}Includes small amount of ship's stores and shipments for British Government installations abroad.

^{2/}Breakdown not available.

Source: British White Fish Authority.

WARP-LOAD METER FOR FISHING VESSELS DEVELOPED:

A warp-load meter for measuring strain or tension in seine-net warps has been developed by the White Fish Authority of Great Britain. Its purpose is to show skippers at a glance the tension in the warp and thus let them know at once when a net has hung up. This enables the skipper to take immediate steps to reduce the damage to gear.

A version of the warp-load meter proved useful on trawlers and was developed for purse-seiners to make it less costly for skippers to fish new grounds where nets could be lost or badly damaged on obstructions which have not been accurately located. (Trade News, April-May 1966, Canadian Department of Fisheries.)

Table 2 - British Frozen Processed White Fish Supply Situation, 1963-1965							
Year	Fish Used In Production	Domestic Production			Imports		
		Total Production	Bulk or Institutional Packs	Consumer Packs	Total Imports	Bulk or Institutional Packs	Consumer Packs
			(Long Tons)				
1965	158,962	72,556	34,135	38,421	31,222	23,640	7,582
1964	136,408	1/62,601	1/30,054	1/32,547	23,439	14,969	8,470
1963	129,000	58,062	27,445	30,617	18,748	10,451	8,297
1962	128,442	57,799	33,763	24,036	20,314	11,774	8,540
1961	127,020	56,157	29,996	26,161	20,445	13,551	6,894
1960	116,500	52,417	29,930	22,487	16,187	8,233	7,954
1959	98,102	43,292	25,249	18,043	9,182	3,348	5,834
1958	94,037	42,747	28,751	13,996	5,169	1,944	3,225
1957	81,087	37,119	25,204	11,915	3,685	2,063	1,622
1956	78,309	36,629	2/	2/	3,154	2/	2/
1955	67,655	31,543	2/	2/	2,222	2/	2/
1954	54,612	25,929	2/	2/	1,638	2/	2/
1953	26,910	13,007	2/	2/	3/	3/	3/

^{1/}Revised.

^{2/}Breakdown not available.

^{3/}Included in production data.

Source: British White Fish Authority.

A sharp increase was reported in 1965 British production of frozen processed white-fish products, as British firms built up freezer trawler fleets and expanded distribution facilities for frozen products. Exports increased in 1965, but they were still only about half the volume of imports. One indication of the change in British marketing methods is that British output of consumer packs of frozen white fish has exceeded production of bulk packs since 1963.

British stocks of frozen processed white fish on January 1, 1965, totaled 16,977 long tons. Closing stocks on December 31, 1965, were 27,161 tons.

Note: See Commercial Fisheries Review, October 1965 p. 98.

* * * * *

Foreign Fishing Off United States Coasts, June 1966

IN NORTHWEST ATLANTIC:

Soviet: The number of Soviet fishing vessels on Georges Bank in the Northwest Atlantic increased considerably during June from over 100 vessels early in the month to an estimated 150 by month's end.

A total of 161 vessels (exclusive of duplication) was sighted during the month and identified as 60 factory stern trawlers, 9 freezer stern trawlers, 24 medium refrigerated side trawlers, 53 medium side trawlers, 1 large

refrigerated side trawler, 4 refrigerated fish transports, 3 factory base ships, 4 cargo and supply ships, 2 fuel and water carriers, and one seiner-type vessel which was not rigged for fishing. This compares to 141 vessels sighted during May 1966 and 178 in June 1965.



Fig. 1 - Soviet factory-type stern trawler fishing in the Northwest Atlantic.

The fleet was dispersed in large groups along the 50- and 100-fathom curves from southeast of Nantucket Lightship (off Massachusetts) to the southeast part of Georges Bank, but about 25 vessels operated intermittently in the vicinity of Cultivator Shoals (northern Georges Bank).

The principal species taken by the Soviets appeared to be whiting (silver hake) and lesser amounts of herring. The Soviets apparently were exerting maximum fishing effort in areas where whiting and herring are normally found in abundance, yet their catches were only moderate to poor.

Romanian: One Romanian factory stern trawler was sighted among the Soviet fleet on the southeast part of Georges Bank. Two of those vessels were observed on Georges Bank in late summer and early fall of 1965.

Polish: No vessels were sighted.

OFF MID-ATLANTIC:

Soviet: No vessels were sighted during June off the mid-Atlantic coast of the United States. The large Soviet fleet fishing off the mid-Atlantic in May 1966 moved north to Georges Bank accounting for most of the increase in that area. Some vessels left for Soviet ports to discharge their catch in frozen or processed form.

IN GULF OF MEXICO AND CARIBBEAN:

Cuban: No Cuban vessels were reported fishing off U.S. coasts. Most of Cuban high-seas fishing operations take place off the Mexican coast where during the so-called "Campeche Patrol," the U.S. Coast Guard sighted 15 Lambda-class Cuban fishing vessels northwest of Progreso (Mexico) during its patrol from May 3 to May 11, 1966. They were fishing alongside 30 Mexican fishing vessels.



Fig. 2 - Cuban Lambda-class fishing vessel fishing on the Campeche Banks off Mexico.

Soviet: Most Soviet vessels operating out of Cuba are fishing with the Cuban fleet in the general area of the Campeche Banks on the wide Continental Shelf north of the Yucatan Peninsula. Their number was estimated at no more than about 12. Occasionally, however, those vessels do approach U.S. coasts. On May 6, a large modern refrigerated carrier was sighted anchored about 20 miles west of Anclote Keys (northwest of Tampa, Fla.) accepting fish from 2 medium stern trawlers. Because of darkness (11 p.m.), it was not possible to get vessel names or observe the species transferred.

Norwegian: On June 5, a U.S. shrimp vessel observed a Norwegian fishing vessel operating about 30 miles south southwest of Tampa, Fla., near Egmont Key.

OFF PACIFIC NORTHWEST (Washington and Oregon States):

Soviet: The Soviet fleet (consisting of stern trawlers, side trawlers, and support vessels that had in previous months been fishing for ocean perch off the coast of Oregon) spent the month of June off the coast of Washington fishing for Pacific hake.

At the start, they were working off of Willapa Harbor, Wash., and from there worked up the coast of Washington to as far north as LaPush, Wash. Apparently the few boats that were left to work off Willapa Harbor found

the abundance of Pacific hake to be greater than was found by the fleet working off of La-Push and Destruction Island. As a result, the bulk of the Soviet fleet moved back south and joined the fleet working off Point Grenville and Willapa Harbor. When that area was checked on June 29, 1966, it was found that all but three of the Soviet vessels were operating there.

The first of June there were about 42 Soviet vessels working off the Washington coast. During a flight on June 29, a total of 105 Soviet vessels was sighted working off that coast.

The first midwater trawling activity was observed on June 27; at that time 4 vessels using this type of gear were observed. Later, 4 additional vessels were seen with midwater trawls. The midwater trawl is towed by two Soviet vessels and during the course of the tow, other Soviet vessels pass between the two towing apparently to spot schools of fish for them and also to check the depth the trawl is fishing. They primarily were catching hake. One catch of about 100 tons was taken in one haul by a pair of trawlers.

During the period while the Soviet fleet was under surveillance, no vessel was seen within five miles off the U. S. coast, nor were any of them seen fishing salmon. The surveillance from Coast Guard surface craft was continuous night and day.

* * * * *

OFF ALASKA:

Japanese: At the end of June about 200 Japanese fishing and support vessels were operating in waters off Alaska. This was almost twice the number as at the end of May when 111 were sighted. However, this is a typical seasonal increase. In addition, 4 salmon motherships accompanied by 142 catcher vessels were fishing for salmon in the North Pacific between 175° W. longitude and 170° E. longitude. (The other 7 motherships with their 227 catcher vessels had moved west beyond 170° E.)

About 25 Japanese vessels (factoryships and trawlers) were fishing for ocean perch in the central and western Gulf of Alaska.

Four Japanese fish-meal factoryships with about 100 trawlers were fishing in the Bering Sea.



Fig. 3 - Hoisting gear in the bow of a trawler fishing for a Japanese factoryship in the Bering Sea.

In the shrimp fishery, 1 factoryship and about 15 trawlers remained on the grounds northwest of the Pribilof Islands. Several trawlers were fishing shrimp near the Shumagin Islands in the western Gulf of Alaska.



Fig. 4 - Squaring away the deck of a Japanese factory-mothership preparatory to leaving the fishing grounds in the Bering Sea. Fillet-freezing pans in the foreground.

Two factoryships and 10 catcher boats continued king crab fishing on the Bristol Bay flats. One of these fleets moved eastward during the month.



Fig. 5 - Japanese fishmeal factoryship in the Bering Sea.



Fig. 6 - Japanese crab factoryship in Bristol Bay.

A total of 3 whaling factoryships with about 30 killer vessels were spread from the eastern Gulf of Alaska to the far Aleutian chain.



Fig. 7 - Trawler fishing for a Japanese crab factoryship in Bristol Bay.

Soviet: During June the number of fishing vessels operating off Alaska decreased. By the end of the month less than 100 Soviet vessels remained in the area, almost half the number fishing there in May and at the beginning of June 1966.

As it has been for the past year, trawling for Pacific oceanperch continues as the largest Soviet fishery off Alaska. Throughout May a fleet of from about 70 to well over 100 vessels fished for perch in the Gulf of Alaska and in the Bering Sea.

This large fleet was divided into 4 major operational areas. In southeast Alaska--almost 50 vessels engaged in perch fishing early in June, but their numbers dwindled down to about 12 towards the end of the month; by early July that fishery was abandoned by the Soviets. The vessels fishing there moved mostly southward accounting for the large increase in the number of vessels in the hake fishery off the Pacific Northwest.

In the Central Gulf of Alaska--a major change occurred about the middle of the month when most of the fleet moved from the Yakutat fishing grounds west to join the Soviet perch fleet on Portlock Banks. The Portlock fleet doubled during June to over 50 vessels. Some of the Alaska Gulf perch-fishing vessels had

excellent catches. At least one large stern trawler was reported as having caught a total of over 1,200 metric tons (2.6 million pounds) in June alone; the largest daily catch for that vessel was 60 metric tons of perch.

Off Western Aleutians--fishing for ocean perch did not change during June. An average of about 10 vessels operated intermittently in various areas of the Western Aleutians.

Bering Sea--a new fishery for Pacific ocean perch was started. In 1960, the Soviet fishing fleets began a short-lived perch fishery near the Pribilof Islands (after the herring season in that area was terminated) and caught about 7,000 metric tons. In subsequent years, however, when a highly successful Gulf of Alaska perch fishery was started, the fishing grounds off the Pribilofs received no attention. Early in 1966, the Soviet Far Eastern Fishery administrators ordered a renewal of perch fishing along the limits of the Continental Shelf off the Pribilofs. In May, an exploratory vessel discovered large Pacific perch concentrations in the central Bering Sea and the build-up of the fishing fleet followed. By the end of June about 12 medium trawlers operated in that area.

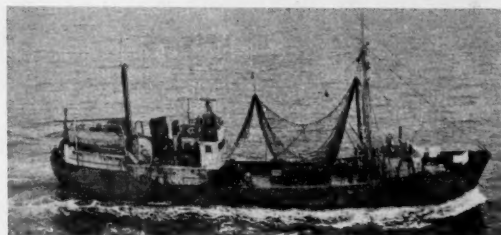


Fig. 8 - Older-type Soviet side trawler under way in Bering Sea with all nets aboard.

Soviet shrimp fishing in the Shumagin Islands area ended during June and the vessels either returned to their Siberian home ports



Fig. 9 - A Soviet refrigerated fish transport operating in the Bering Sea and Gulf of Alaska.

or were transferred to other fisheries. Shrimp from this fishery were mostly exported to: Japan which reportedly imported over 4,000 metric tons during January-May 1966 at a price of \$240 per ton c.i.f.; to France and Italy; in smaller amounts to Poland, Czechoslovakia, and North Korea. To continue earning hard currencies, the Soviets are now organizing in Vladivostok the second shrimp-catching fleet expedition.

The three king crab factoryships accompanied by tangle-net handling trawlers continued to operate during June on the Continental Shelf off the western Alaska Peninsula.

The whaling operations which began in May off the farthest Aleutians have moved, like in the past years, closer to the United States mainland. According to the Seattle Times of June 9, one of the whaling fleets (consisting of a factoryship and several whale catchers) operated about 600 miles off the State of Washington's coasts, making sizable catches. Navy fliers who flew over the Soviet whaling fleet reported that 6 or 7 whales were killed in the week of May 21 when the Navy patrol flew over the area.



LITTLE SMELT BELTS BIG PROTEIN PUNCH

Smelt scores again! The little fish with the big flavor has won new popularity in a Columbia River Smelt Sandwich. This unusual recipe comes to you from the Department of the Interior's Bureau of Commercial Fisheries. The delicate sweet-flavored smelt are rolled in egg and seasoned crumbs, then fried in deep fat. Served in rolls with tartar sauce, smelt brings a real protein punch to your eating enjoyment.

In nature smelt are found from the Gulf of St. Lawrence to the Virginia Capes, the Great Lakes area, and the mighty Columbia River. In markets they are found practically everywhere the year round. Economical too!



COLUMBIA RIVER SMELT SANDWICH

- | | |
|--|-----------------------------|
| 1 pound pan-dressed smelt or other small | 2 teaspoons paprika |
| pan-dressed fish, fresh or frozen | 2 teaspoons dried thyme |
| 1 egg, beaten | $\frac{1}{2}$ teaspoon salt |
| 1 tablespoon milk | 6 hot dog rolls, heated |
| 1 cup dry bread crumbs | Tartar sauce |

Thaw frozen fish. Clean, wash, and dry fish. Combine egg and milk. Combine crumbs and seasonings. Dip fish in egg mixture and roll in crumb mixture. Place in single layer in a fry basket. Fry in deep fat, 350° F., for 2 to 3 minutes or until brown and fish flakes easily when tested with a fork. Drain on absorbent paper. Spread rolls with tartar sauce. Place 3 or 4 fried fish in each roll. Serve with additional tartar sauce. Serves 6.



FEDERAL ACTIONS



Department of the Interior

FISH AND WILDLIFE LAW ENFORCEMENT

STRENGTHENING OF FISH AND WILDLIFE LAW ENFORCEMENT SOUGHT:

The Department of the Interior announced on April 28, 1966, that it had asked Congress to provide for increased wildlife protection and facilitate enforcement of certain criminal statutes covering offenses against wildlife.

A Department-proposed amendment to the Criminal Code would extend protective Federal laws to every part of the United States in order to curb the \$1 million a year alligator poaching racket that is depleting these valuable reptiles. Alligator hides are in great demand for expensive shoes and purses. Raw hides 5 to 6 feet long sell for \$6 a foot. Interior's Bureau of Sport Fisheries and Wildlife reported those prices create an incentive for poachers to violate State laws designed to protect alligators, now on the Interior Department's list of endangered species.

Existing law makes it a Federal offense to transport in interstate traffic wild mammals and birds taken in violation of State, Federal, or foreign law. The Interior Department has suggested that the law be extended to cover reptiles (such as alligators), amphibians (frogs), mollusks, including oysters and clams, and crustacea, such as crabs and lobsters.

The Department also proposed amendments concerning penalties designed to protect wild animals and property on Federal sanctuaries, refuges, or breeding grounds.

As proposed, the Criminal Code would be amended to:

- (1) Extend coverage to all Federal areas administered for the conservation of wildlife and to all other Federal areas that may be set aside by the Secretary of the Interior to aid wildlife.

- (2) Define "wildlife" to include wild mammals and birds, reptiles, amphibians, fish, mollusks, crustacea, and all other classes of wild animals.

- (3) Prohibit violation of regulations set by United States agencies responsible for wildlife areas concerning automobiles, disorderly conduct, or littering.

- (4) Provide new authority to Interior Department employees to arrest persons violating regulations and to search for and seize any property used or possessed illegally.

A third recommendation would amend the Criminal Code governing importation of injurious species of wildlife. At present, the Secretaries of Interior and Treasury share enforcement responsibility, but there is no provision for arrests or seizure of property used in violation of this section. The proposed bill would provide Interior and Customs Bureau employees with this authority.

A bill submitted to Congress by the Department of the Interior, would also make unlawful interstate or foreign commerce in wild animals or birds without marking the package with the name of sender and consignee, and the contents by number and kind. Included would be reptiles, amphibians, mollusks, and crustacea--thus authorizing Federal game management agents to aid State enforcement further of laws intended to curb illegal traffic in alligator hides.

Interior's bill would increase the jurisdiction of a United States Commissioner who now, when designated by a court for the purpose, may try and sentence persons committing petty offenses in any place over which Congress has exclusive power to legislate or over which the United States has concurrent jurisdiction with a State. While petty offenders in national parks may be tried by a Commissioner, there is no statutory authority for their jurisdiction over such violations on most national wildlife refuges and other Federal wildlife areas.

The proposal would extend such jurisdiction to any Federal area. A Commissioner

also could try violators of laws and regulations administered by the Secretary of the Interior for the protection and conservation of fish and wildlife, regardless of where the offense was committed. This would include violations of the Migratory Bird Treaty Act, "Duck Stamp Act," Bald Eagle Act, and Black Bass Act.

In 1964, Congress authorized Commissioners to have jurisdiction over offenses in National Forests. At present, a petty offender can choose to be tried by a District Court, but may not be tried by a Commissioner without the suspect's written consent. This choice would be retained under the expanded jurisdiction.

FISH AND WILDLIFE SERVICE

BUREAU OF COMMERCIAL FISHERIES

APPLICATIONS FOR FISHING VESSEL LOANS:

The following applications have been received for loans from the U. S. Fisheries Loan Fund to aid in financing the construction or purchase of fishing vessels.

Crosby B. Ames, Matinicus, Maine 04851, construction of a new 30-foot wood vessel to engage in the fishery for lobster. Notice of the application was published by the U. S. Department of the Interior's Bureau of Commercial Fisheries in the Federal Register, June 15, 1966.

Lawrence Finlay, Box 2296, Kodiak, Alaska 99615, purchase of a used 61.7-foot registered length wood vessel to engage in the fishery for Dungeness crab, king crab, and salmon. Notice of the application was published in the Federal Register, June 15, 1966.

Frank D. Todd, 950 Broadway, Riviera Beach, Florida 33404, purchase of a used 30-foot wood vessel to engage in the fishery for mackerel, snappers, and groupers. Notice of the application was published in the Federal Register, June 15, 1966.

Alois Kopun, Sr., Box 73, Kodiak, Alaska 99615, purchase of a used 42-foot vessel to engage in the fishery for halibut, Dungeness crab, and king crab. Notice of the application was published in the Federal Register, June 16, 1966.

Arthur Walter Bidle, 1863 Royal Palm Ave., Fort Myers, Florida 33901, purchase of a 61.6-foot registered length wood vessel to engage in the fishery for shrimp. Notice of the

application was published in the Federal Register, June 21, 1966.

Charles H. Bundrant and Donald J. Arndt, Box 1515, Kodiak, Alaska 99615, purchase of a 54.5-foot registered length wood vessel to engage in the fishery for king crab. Notice of the applications was published in the Federal Register, June 21, 1966.

Chester R. Humphries, 216 Lagoon Drive, Russell Park, Fort Myers, Florida 33901, purchase of a used 61.6-foot wood vessel to engage in the fishery for shrimp. Notice of the application was published in the Federal Register, June 23, 1966.

"Margaret F." Corp., 3107 Jarvis St., San Diego, California 92106, purchase of a used 53.9-foot registered length wood vessel to engage in the fishery for tuna. Notice of the application was published in the Federal Register, July 14, 1966.

Regulations and procedures governing fishery loans have been revised and no longer require that an applicant for a new or used vessel loan replace an existing vessel (Public Law 89-85; Fisheries Loan Fund Procedures--50 CFR Part 250, as revised August 11, 1965.)

Note: See Commercial Fisheries Review, July 1966 p. 101.

REGULATIONS ON PAYMENT OF SUBSIDIES UNDER FISHING FLEET IMPROVEMENT ACT OF 1964 AMENDED:

An amendment providing a procedure for the payment of subsidies under the Fishing Vessel Construction Differential Subsidy Program, published in the Federal Register, July 2, 1966, relaxes current restrictions contained in Part 256 Code of Federal Regulations.

The amendment which became effective on publication in the Federal Register of that date follows:

Title 50—WILDLIFE AND FISHERIES

Chapter II—Bureau of Commercial Fisheries, Fish and Wildlife Service, Department of the Interior

PART 256—FISHING VESSEL CONSTRUCTION DIFFERENTIAL SUBSIDY PROCEDURES

On page 16088 of the FEDERAL REGISTER of December 2, 1964, there was published a notice and text of a proposed revision of Part 256. These regulations became effective on December 22, 1964. The amendment set forth herein provides a procedure for the payment of subsidy relaxing current restrictions contained in § 256.10 of Part 256 Code of

Federal Regulations in order that subsidy payments may be made in accordance with the terms of the subsidy contract if agreed by the Maritime Administrator.

Effective date. This amendment shall be effective upon publication in the FEDERAL REGISTER.

Section 256.10 is amended by adding the following paragraph (d):

§ 256.10 Payment of subsidy.

(d) If the Maritime Administrator agrees, by his clearance of a payment schedule set forth in a pro forma construction contract to accompany a request for bids, that it is in the public interest to allow the percentage of the subsidized construction cost withheld to be less than 30 percent of the subsidized

construction cost, then the subsidy contract executed in connection with such construction contract shall reflect payment in accordance with such payment schedule.

HAROLD E. CROWTHER,
Acting Director,
Bureau of Commercial Fisheries.

JUNE 29, 1966.

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**U.S. STANDARDS FOR
GRADES OF FROZEN HEADLESS
DRESSED WHITING ADOPTED:**

The adoption of voluntary U. S. standards for grades of frozen headless dressed whiting was published in the Federal Register, July 14, 1966, as an amendment to Title 50, Code of Federal Regulations, Part 271.

The voluntary standards of quality are designed to: (1) represent the differences in mar-

ket value; (2) achieve a uniform quality description of the product to aid trading; and (3) aid processors in establishing quality control programs. The standards are used by U. S. Department of the Interior inspectors as the basis for determining the quality level of whiting in processing plants operating under the Bureau of Commercial Fisheries Inspection program.

Following are the standards as published in the Federal Register, July 14, 1966:

**Title 50—WILDLIFE AND
FISHERIES**

**Chapter II—Bureau of Commercial
Fisheries, Fish and Wildlife Service,
Department of the Interior**

**SUBCHAPTER C—PROCESSED FISHERY PRODUCTS,
PROCESSED PRODUCTS THEREOF, AND CERTAIN
OTHER PROCESSED FOOD PRODUCTS**

**PART 271—U.S. STANDARDS FOR
GRADES OF FROZEN HEADLESS
DRESSED WHITING**

On pages 7244 and 7255 of the FEDERAL REGISTER of May 18, 1966, there was published a notice and text of a proposed new Part 271—U.S. Standards for Grades of Frozen Headless Dressed Whiting of Title 50, Code of Federal Regulations.

Interested persons were given 30 days to submit written comments, suggestions or objections with respect to the proposed new part. No responses to the proposal were received.

The new part is issued pursuant to sections 203 and 205 of Title II of the Agricultural Marketing Act of 1946, 60 Stat. 1087, 1090, as amended, 7 U.S.C. sections 1622 and 1624 (1958), as transferred to the Department of the Interior by section 6(a) of the Fish and Wildlife Act of 1956, 70 Stat. 1122 (1956), 16 U.S.C. section 742e (1958).

Accordingly, the new Part 271—U.S. Standards for Grades of Frozen Headless Dressed Whiting is hereby adopted without change and is set forth below. This part shall become effective at the beginning of the 30th calendar day following the date of this publication in the FEDERAL REGISTER.

DONALD L. MCKERNAN,
Director,
Bureau of Commercial Fisheries.

JULY 8, 1966.

**PART 271—U.S. STANDARDS FOR
GRADES OF FROZEN HEADLESS
DRESSED WHITING¹**

Sec.	Description of the product.
271.2	Grades of frozen headless dressed whiting.
271.11	Determination of the grade.
271.21	Definitions and methods of analysis.
271.25	Tolerances for certification of officially drawn samples.

AUTHORITY: The provisions of this Part 271 are issued under sec. 6, 70 Stat. 1122; 16 U.S.C. § 742e; and secs. 203 and 205, 60 Stat. 1087, 1090, as amended; 7 U.S.C. 1622, 1624.

§ 271.1 Description of the product.

The product described in this part consists of clean, wholesome whiting (silver hake) *merluccius bilinearis*, *merluccius albidus*, completely and cleanly headed and adequately eviscerated. The fish are packaged and frozen in accordance with good commercial practice and are maintained at temperatures necessary for the preservation of the product.

§ 271.2 Grades of frozen headless dressed whiting.

(a) "U.S. Grade A" is the quality of frozen headless dressed whiting that (1) possess a good flavor and odor and that (2) for those factors that are rated in accordance with the scoring system outlined in this part, have a total score of 85 to 100 points.

(b) "U.S. Grade B" is the quality of frozen headless dressed whiting that (1) possess at least reasonably good flavor and odor and that (2) rate a total score of not less than 70 points for those factors of quality that are rated in accordance with the scoring system outlined in this part.

(c) "Substandard" or "Utility" is the quality of frozen headless dressed whiting that meet the requirements of § 271-1 but that otherwise fail to meet the requirements of "U.S. Grade B."

¹ Compliance with the provisions of these standards shall not excuse failure to comply with the provisions of the Federal Food, Drug, and Cosmetic Act.

§ 271.11 Determination of the grade.

In a plan under Continuous USDI Inspection the grade is determined by examining the product for factors 1-10 in the thawed state and factor 11 in the cooked state. For lot inspection, examination of the product for factors 1, 2, and 3 is carried out in the frozen state and 4-10 in the thawed state. Factor 11 is examined in the cooked state.

(a) **Factors rated by score points.** Points are deducted for variations in the quality of each factor in accordance with the schedule in Table 1. The total of is 100; the minimum score is 0.

(b) **Factors not rated by score points.** Points deducted is subtracted from 100 to obtain the score. The maximum score The factor of "flavor and odor" is evaluated organoleptically by smelling and tasting after the product has been cooked in accordance with § 278.21.

(1) Good flavor and odor (essential requirements for a U.S. Grade A product) means that the cooked product has the typical flavor and odor of the species and is free from rancidity, bitterness, staleness, and off-flavors and off-odors of any kind.

(2) Reasonably good flavor and odor (minimum requirements of a U.S. Grade B product) means that the cooked product is lacking in good flavor and odor, but is free from objectionable off-flavors and off-odors of any kind.

§ 271.21 Definitions and methods of analysis.

(a) **Selection of the sample unit.** The sample unit consists of the primary container and its entire contents. The whiting are examined according to Table 1. Definitions of factors for point deductions are as follows:

(b) **Examination of sample, frozen state.** When this product is examined under Continuous USDI Inspection, the

samples are examined for factors 1, 2, and 3 in Table 1 in the thawed state. When the product is lot inspected, the samples are examined for factors 1, 2, and 3 in Table 1 in the frozen state.

(1) "Arrangement of product" refers to the packing of the product in a symmetrical manner, bellies or backs all facing in the same direction, fish neatly dovetailed.

(2) "Condition of the packaging material" refers to the condition of the cardboard or other packaging material of the primary container. If the fish is allowed to stand after packing and prior to freezing, moisture from the fish will soak into the packaging material and cause deterioration of that material.

(3) "Dehydration" refers to the presence of dehydrated (water-removed) tissue on the exposed surfaces of the whitening. Slight dehydration is surface dehydration which is not color-masking. Deep dehydration is color-masking and cannot be removed by scraping with a fingernail.

(c) *Examination of sample, thawed state.* Thawed state means the state of the product after being thawed. Thawing the sample is best accomplished by enclosing the sample in a film type bag and immersing in an agitated water bath held at 68° F., $\pm 2^\circ$ F. Allow the product to remain immersed until thawed. Alternatively when the facilities are lacking for water thawing, the sample may be thawed by slacking it out at a temperature between 30° to 40° F. on an aluminum tray from 2 hours for a 1½-pound sample to 8 hours for a 10-pound sample.

(1) "Minimum size" refers to the size of the individual fish in the sample. Fish 2 ounces or over are considered acceptable. Smaller fish cannot be cooked uniformly with acceptable size fish. Separate the fish of unacceptable size, divide their number by the weight of the sample in pounds, and apply to Table 1. Example—four fish of unacceptable size in a 5-pound package is $\frac{4}{5} = 0.8$, a 10 point deduction.

(2) "Uniformity." From the fish remaining, select by count 10 percent (minimum of one fish) of the largest and 10 percent (minimum of one fish) of the smallest and divide the largest weight by the smallest weight to get a weight ratio.

(3) "Heading" refers to the condition of the fish after they have been headed. The fish should be cleanly headed behind the gills and pectoral fins. No gills, gill bones, or pectoral fins should remain after the fish have been headed.

(4) "Evisceration" refers to the cleaning of the belly cavities of the fish. All spawn, viscera, and belly strings should be removed.

TABLE 1.—SCHEDULE OF POINT DEDUCTIONS PER SAMPLE FROZEN STATE (LOT INSPECTION ONLY)			
	Factors scored	Method of determining score	Deduct
1	Arrangement of product ¹	Small degree: 10 percent of fish twisted or bellies and backs not facing the same direction. Large degree: More than 10 percent of fish twisted, void present or some fish cross packed.	2 1
2	Condition of packaging (overall assessment).	Poor: Packaging material has been soaked, softened or deteriorated.	2
3	Dehydration	Small degree: Slight dehydration of the exposed surfaces. Large degree: Deep dehydration of the exposed surfaces.	2 5
THAWED STATE			
4	Minimum size: Fish 2 oz. or over are of acceptable size.	Number of fish less than 2 oz. per lb. Over 0—not over 0.5..... Over 0.5—not over 1.0..... Over 1.0—not over 2.0..... Over 2.0.....	5 5 20 20
5	Uniformity: Weight ratio of fish remaining. The 10 percent largest fish divided by the 10 percent smallest fish. ¹	Weight ratio 10 percent smallest and 10 percent largest: Over 2.0—not over 2.4..... Over 2.4—not over 2.8..... Over 2.8—not over 3.2..... Over 3.2—not over 3.6..... Over 3.6.....	2 5 10 20 30
6	Heading ¹	Small degree: 10 percent of fish carelessly cut. Moderate degree: Over 10 percent of fish carelessly cut.	5 15
7	Evisceration (overall assessment).	Small degree: Slight evidence of viscera..... Moderate degree: Moderate amounts of spawn, viscera, etc. Large degree: Large amounts of viscera, spawn, etc.	2 10 30
8	Scaling ¹	Small degree: 10 percent of fish not well scaled. Large degree: Over 10 percent of fish not well scaled.	2 5
9	Color of the exposed surfaces (overall assessment).	Small degree: Minor darkening, dulling. Large degree: Objectably dark, brown, dull.	2 5
10	Bruises and split or broken skin.	Presence of bruises and/or broken or split skin per pound: Over 0—not over 0.5..... Over 0.5—not over 1.0..... Over 1.0—not over 1.5..... Over 1.5—not over 2.0..... Over 2.0.....	1 2 4 7 10
11	Texture: (overall assessment)	Small degree: Moderately dry, tough, mushy, rubbery, watery, stringy. Large degree: Excessively dry, tough, mushy, rubbery, watery, stringy.	5 15

¹ 10 percent of fish refers to 10 percent by count rounded to nearest whole fish.

(5) "Scaling" refers to the satisfactory removal of scales from the fish.

(6) "Color of the cut surfaces" refers to the color of the cut surfaces of the fish after heading and other processing.

(7) "Bruises and broken or split skin" refers to bruises over one-half square inch in area and splits or breaks in the skin more than one-half inch in length which are not part of the processing.

(d) *Examination of sample, cooked state.* Cooked state means the state of the sample after being cooked. Cooking the sample is best accomplished by inserting the sample into a film type bag and submerging it into boiling water for from 18–20 minutes. A minimum of three fish per sample unit shall be cooked.

(1) "Texture defects" refers to the absence of normal textural properties of the cooked fish flesh, which are tender-

ness, firmness, and moistness without excess water. Texture defects are dryness, softness, toughness, and rubberiness.

(e) *General definitions.*

(1) *Small* (overall assessment) refers to a condition that is noticeable but is only slightly objectionable.

(2) *Moderate* (overall assessment) refers to a condition that is distinctly noticeable but is not seriously objectionable.

(3) *Large* (overall assessment) refers to a condition which is both distinctly noticeable and seriously objectionable.

§ 271.25 Tolerances for certification of officially drawn samples.

The sample rate and grades of specific lots shall be certified in accordance with Part 260 of this chapter (Regulations Governing Processed Fishery Products).

Note: See *Commercial Fisheries Review*, July 1966 p. 101.

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JOHNSON APPOINTED PACIFIC NORTHWEST REGIONAL DIRECTOR:

The appointment of Donald R. Johnson as Regional Director of the Pacific Northwest



Donald R. Johnson

Region of the Bureau of Commercial Fisheries with headquarters in Seattle, Wash., was announced July 12, 1966, by the U. S. Department of the Interior. Johnson was formerly Director of the Bureau's Pacific Southwest Region, administered from Terminal Island, Calif. He succeeds Samuel J. Hutchinson, who now heads the Bureau's recently created Office of International Trade Promotion in Washington, D. C.

Johnson will direct all Bureau activities in Oregon, Washington, Idaho, Montana, and Wyoming; advise the Bureau Director Donald L. McKernan in developing regional, national, and international policies and programs; oversee the management of the fur seal herd on the Pribilof Islands in accordance with international treaty; and give particular attention to the status of Columbia River salmon and the development of the Pacific hake fishery. He will also supervise scientific research work in the Northwest Pacific Ocean.

Johnson was born in Portland, Oreg. In 1939 he received a Bachelor of Science degree in fisheries from Oregon State University and later took graduate courses in fisheries at the University of Washington. For three years he was staff scientist on the International Pacific Salmon Fisheries Commission; for 6 years, he directed research on fish populations of the Columbia River for the Oregon Fish Commission; for 7 years, he was Chief Supervisor of Research, Washington State Department of Fisheries. In 1958 he joined the Bureau of Commercial Fisheries to direct its programs in southern California. When that area became the Bureau's Pacific Southwest Region in 1964, he was named Regional Director.

NEW DIRECTOR OF SEATTLE TECHNOLOGICAL LABORATORY APPOINTED:

The appointment of Maynard A. Steinberg as Director of the Bureau of Commercial

Fisheries Technological Laboratory in Seattle, Wash., effective July 1, 1966, was announced by the U. S. Department of the Interior. He succeeds Maurice E. Stansby, who will head a new research unit, and has worked for the



Maynard A. Steinberg

past 10 years at the Bureau's Technological Laboratory in Gloucester, Mass.

The Seattle Laboratory studies the properties and chemical reactions of fish oils to improve and expand the market for marine products. Other research includes pasteurization of several species of fish to extend their storage life. The laboratory also seeks to increase the utilization and improve the quality of fish and fishery resources.

Steinberg who was born at Winthrop, Mass., received his Bachelor of Science degree from the University of Massachusetts in 1946, his Masters degree in chemistry from the University of Oregon in 1948, and his Doctorate at the University of Massachusetts in 1955.



Eighty-Ninth Congress (Second Session)



Public bills and resolutions which may directly or indirectly affect the fisheries and allied industries are reported upon. Introduction, referral to committees, pertinent legislative actions by the House and Senate, as well as signature into law or other final disposition are covered.

COMMERCIAL FISHERY RESOURCES SURVEY:
S. Rept. 1202, Survey of Fishery Resources (June 2, 1966, report from the Committee on Commerce, U. S. Senate, 89th Congress, 2nd session, to accompany S. J. Res. 29), 8 pp., printed. Committee reported favorably with amendments. Discusses purpose, legislative history, need, costs, agency reports, and changes in existing law.

Rep. Keith in extension of his remarks (Congressional Record, June 20, 1966, p. A3302), urged Members of the House to concur in S. J. Res. 29 which passed the Senate on June 7, 1966. This resolution would authorize and direct the Secretary of the Interior to conduct a survey of the coastal and fresh water commercial fishery resources of the United States, its territories, and possessions.

COMMODITY PACKAGING AND LABELING: Introduced in House H. R. 15832 (Bingham), H. R. 15850 (Rooney of Pa.), H. R. 15856 (Thompson of N. J.), June 22, 1966; H. R. 15949 (Helstoski), H. R. 15958 (Udall), June 27; H. R. 16002 (O'Hara of Mich.), H. R. 16010 (Burton of Calif.), H. R. 16014 (Moorhead), June 28; H. R. 16163 (Dent), July 12; and H. R. 16207 (Conyers) July 13; to regulate interstate and foreign commerce by preventing the use of unfair or deceptive methods of packaging or labeling of certain consumer commodities distributed in such commerce, and for other purposes; to Committee on Interstate and Foreign Commerce. Rep. Thompson (Congressional Record, June 22, 1966, p. 13329) stated that his bill is identical to H. R. 15440, which was introduced June 2, by Rep. Staggers. He inserted in the Record a brief analysis of H. R. 15440 as submitted by Rep. Staggers.

House Committee on Interstate and Foreign Commerce announced June 30, 1966, that it would conduct public hearings from July 26 through Aug. 4, 1966, on S. 985, the Fair Packaging and Labeling Act.

ENVIRONMENTAL POLLUTION: In extension of his remarks Rep. Blatnik inserted in Congressional Record, June 14, 1966 (pp. A3193-A3195), an article by Rep. Richard D. McCarthy, N. Y., which appeared in the first quarter of the 1966 Perspective publication by Cornell University, titled "Challenge To Science For A Cleaner America: Environmental Pollution."

ESTUARINE AREAS--NATIONAL SYSTEM OF ESTUARINE AREAS: S. 3528 (Kennedy of Mass.) introduced in Senate June 20, 1966, to authorize the Secretary of the Interior in cooperation with the States to preserve, protect, develop, restore, and make accessible estuarine areas of the Nation which are valuable for sport and commercial fishing, wildlife conservation, recreation, and scenic beauty, and for other purposes; to Committee on Commerce. Sen. Kennedy spoke in the Senate (Congressional Record, June 20, 1966, pp. 12951-12952) and stated this bill is similar to H. R. 13447 which was introduced Mar. 9, 1966. He stated that the bill provides for a nationwide study by the Secretary of the Interior to identify the estuarine areas which should be protected from further deterioration. Such a study would pinpoint those areas that warrant Federal acquisition and administration because of their national significance. Further stated that under this bill, States and their political subdivisions are encouraged to acquire and administer estuarine areas where the study reveals such acquisition and administration to be desirable. The end result would be a nationwide system of estuarine areas composed of Federally-acquired areas and those designated by the States.

Subcommittee on Fisheries and Wildlife Conservation of House Committee on Merchant Marine and Fisheries June 22, 1966, continued hearings on H. R. 13447.

FISHERIES PROTECTION: Rep. Pelly inserted in Congressional Record, June 27, 1966 (p. A3412), a resolution containing a 6-point program for the protection and conservation of U. S. coastal fishery resources in

the eastern North Pacific Ocean, recently adopted by the Association of Pacific Fisheries, Deep Sea Fishermen's Union, Fishing Vessel Owner's Association, and Northwest Fisheries Association. He stated the resolution is realistic in that it points up the immediate possibilities for resource protection by passage of legislation to extend U. S. fisheries jurisdiction from the present 3 miles to 12 miles, monitoring all foreign fishing operations off our coasts and contacting foreign governments to minimize or prevent international incidents involving loss of gear, vessels, and possibly lives. He stated that the other recommendations involve long-range policy regarding international agreements to extend fisheries jurisdiction beyond 12 miles and recognition of the abstention principle for conservation.

FISHERMEN'S PROTECTIVE ACT AMENDMENT: S. 3499 (Magnuson and I other) introduced in Senate June 15, 1966, to amend the act of August 27, 1954, relating to the seizure of vessels of the United States by foreign countries; to Committee on Commerce. Sen. Magnuson pointed out in Congressional Record, June 15, 1966 (p. 12532), that bill is particularly applicable to U. S. fishing vessels, a number of which have been forcibly seized and detained by foreign governments off the South American coast which claim territorial seas of extraordinary width. Would amend the Fishermen's Protective Act so that the owner of any detained American-flag vessel will be reimbursed by the Secretary of the Treasury for all costs, including demurrage, in addition to reimbursement of any fine required.

FISHING LIMIT OF 12 MILES: Senate Committee on Commerce June 15, 1966, reported with amendment (S. Rept. 1280), on S. 2218, to establish a contiguous fishery zone beyond the territorial sea of the United States.

S. Rept. 1280, Twelve-Mile Fishery Zone (June 15, 1966, report from the Committee on Commerce, U. S. Senate, 89th Congress, 2nd session, to accompany S. 2218), 18 pp., printed. Committee reported favorably with amendment. Discusses purpose, legislative background, need, fishery jurisdiction of other nations, national defense, opposition, historic fisheries, enforcement, cost, and changes in existing law.

Senate June 20, 1966, passed with Committee amendment, S. 2218. Senators Magnuson, Bartlett, Saltonstall, Kennedy (Mass.) spoke in the Senate (Congressional Record, June 20, 1966, pp. 12972-12978), in support of this legislation. Sen. Magnuson inserted in the Record an excerpt from the Committee report on this bill. Also, he stated at one point in his remarks that he will introduce a resolution to authorize an international conference on fisheries conservation.

House June 21, 1966, received Senate-passed S. 2218.

Sen. Bartlett (Congressional Record, July 13, 1966, pp. 14843-14844) discussed the broad implications involved in bills such as S. 2218, to extend U. S. fishery jurisdiction from the present 3-mile limit of its territorial waters to 12 miles off its coasts. He stated that this measure is of national and international importance because it is involved in the development of a sensible sea policy.

Rep. Pelly spoke in the House (Congressional Record, July 14, 1966, p. 14991), concerning a call he received from representatives of Pacific Northwest fishermen regarding foreign fishing around the Columbia River Lightship, 4½ miles off the mouth of the Columbia River. He stated it is becoming more and more evident that a 12-mile fishing zone such as would be established by legislation now before Congress is absolutely essential.

FISH PROTEIN CONCENTRATE PILOT PLANTS: The Committee on Commerce June 23, 1966, reported (S. Rept. 1304), with amendments, S. 2720, to authorize the Secretary of the Interior to develop, through the use of experiment and demonstration plants, practicable and economic means for the production by the commercial fishing industry of fish protein concentrate.

S. Rept. 1304, Fish Protein Concentrate (June 23, 1966, report from the Committee on Commerce, U. S. Senate, 89th Congress, 2nd session, to accompany S. 2720), 11 pp., printed. Committee reported bill favorably with amendments. Discusses purpose, summary, background, need, cost, agency reports, and changes in existing law.

Senate June 27, 1966, passed with committee amendments S. 2720. The Senate rejected amendments submitted by Sen. Williams which would limit the pilot plants to 1 instead of 5 and would reduce authorized appropriations from \$5 million to \$1 million. Sen. Douglas spoke in the Senate (Congressional Record, June 27, 1966, pp. 13763-13767), in support of Sen. Williams' amendments which would conform to the recommendations of the Department of the Interior, the Bureau of the Budget, and the Comptroller General. Extract from the report of the Committee on Commerce was inserted, which included reports of the Department of the Interior and the Bureau of the Budget. Senators Bartlett, Gruening, Magnuson, Saltonstall, and Pastore spoke from the floor in support of the bill as reported by the Committee, which would authorize 5 pilot plants and would authorize appropriations totaling \$5 million.

Senate-passed S. 2720, June 28, 1966, was referred to Committee on Merchant Marine and Fisheries.

Rep. Keith spoke in the House (Congressional Record, June 29, 1966, p. 13996) urging House action on the Senate-passed S. 2720. At one point in his remarks, he stated that he has received reports that FPC will shortly receive the official approval of the Food and Drug Administration.

Sen. Pell spoke in the Senate (Congressional Record, June 29, 1966, pp. 14082-14087) concerning fish protein concentrate. He stated that a brief prospectus concerning reasons why the fish protein concentrate plant should be established at Point Judith, R. I., was an outgrowth of a meeting held in January 1966 with participants from the College of Agriculture of the University of Rhode Island; the Point Judith Fishermen's Cooperative; the University of Rhode Island Graduate School of Oceanography; and the Bureau of Commercial Fisheries. He inserted this prospectus in the Record.

Introduced in House H. R. 16095 (Pelly) June 30, 1966; H. R. 16145 (Hanna) and H. R. 16173 (Tupper), July 12, to authorize the Secretary of the Interior to develop, through the use of experiment and demonstration plants, practicable and economic means for the production by the commercial fishing industry of fish protein concentrate; to Committee on Merchant Marine and Fisheries.

Rep. Hanna stated that this bill is similar to legislation passed by the Senate (S. 2720). He stated that fish protein concentrate experimentation has only begun; the five plants proposed by this bill will greatly increase our knowledge. He urged quick House passage of this bill.

Sen. Bartlett (Congressional Record, July 13, 1966, pp. 14843-14844) discussed S. 2720, to authorize experiment and demonstration plants for the production of fish protein concentrate. He also discussed the value of fish protein concentrate as a food supplement, and that the United States, as the world's richest nation, bears a heavy responsibility in the war against world hunger.

FOOD FOR PEACE MESSAGE: Both Houses June 30, 1966, received the President's message (H. Doc. 457), submitting the annual report on the 1965 activities carried on under the Food for Peace program, Public Law 480, 83rd Congress, as amended. Text of the report is printed in Congressional Record, June 30, 1966 (pp. 14096-14250).

FOOD IRRADIATION PROGRAM: Sen. Price spoke in the House (Congressional Record, July 12, 1966, pp. 14668-14670) concerning the national food irradiation program. Rep. Bates joined in support of this program. He stated that (1) the Bureau of Commercial Fisheries is carrying out a program on the radiation preservation of marine products at the Marine Products Development Irradiator in Gloucester, Mass.; (2) large quantities of fresh fish fillets and similar marine products are packaged and irradiated in order that study can be made at near commercial scale; (3) work is progressing satisfactorily and there is every indication that this new means of preservation will have widespread application for fishery products.

FOOD MARKETING NATIONAL COMMISSION: House June 27, 1966, received a communication from the Chairman, National Commission on Food Marketing, transmitting a report on the structure and performance of the Nation's food marketing system, pursuant to the provisions of Public Law 88-354; referred to Committee on Agriculture.

FOREIGN FISHING OFF U. S. COASTS: Sen. Magnuson inserted in Congressional Record, July 12, 1966 (pp. 14541-14542), a Resolution Proposing a U. S. Fishery Policy for the Eastern North Pacific Ocean, adopted by four of the major fishery organizations--Association of Pacific Fisheries, Deep Sea Fishermen's Union, Fishing Vessel Owners Association, Inc., and Northwest Fisheries Association.

FUR SEAL CONSERVATION AND PRIBILOF ISLANDS ADMINISTRATION: Fur Seals - Pribilof Islands: Hearings before the Committee on Commerce, United States Senate, 89th Congress, 1st and 2nd sessions on S. 2102, a bill to protect and conserve the North Pacific Fur Seals, and to administer the Pribilof Islands for the conservation of fur seals and other wildlife, and for other purposes, Sept. 9, 1965, St. Paul Island, Alaska, Feb. 18, 1966, Washington, D. C., Serial No. 89-57, 162 pp., printed. Contents include text of bill, agency comments, statements and letters of various Federal and State officials, and business representatives.

S. Rept. 1235, Fur Seal Act of 1966 (June 9, 1966, report from the Committee on Commerce, U. S. Senate, 89th Congress, 2nd session, to accompany S. 2102), 38 pp., printed. Committee reported bill favorably with

amendments. Discusses purpose, legislative background, summary of legislation, cost, agency reports, and changes in existing law.

By a Unanimous-Consent Agreement, it was agreed that on June 20, the Senate would consider S. 2102.

Sen. Lausch spoke in the Senate (Congressional Record, June 16, 1966, pp. 12922-12933), in opposition to the part of the bill which would give credit to 54 Aleuts, Eskimos and Indians for employment with the U. S. Government for a period of about 6 or 7 years prior to 1950.

Senate June 20, 1966, passed with Committee amendment (in the nature of a substitute), as amended, S. 2102, a bill to protect and conserve fur seals on the Pribilof Islands. The amendments to the Committee amendment were on Bartlett motions: (1) respecting annuities for certain retired natives of the Pribilof Islands, (2) respecting use of proceeds from sale of lands in these islands, and (3) waiving approval of the Secretary of the Interior in issuance of deed after 10 years following the enactment of this bill. The text of the bill as passed is printed in Congressional Record, June 20, 1966 (p. 12995). Title was amended to read: "A bill to protect and conserve the North Pacific fur seals, to provide for the administration of the Pribilof Islands, to conserve the fur seals and other wildlife on the Pribilof Islands, and to protect sea otters on the high seas."

House June 21, 1966, received Senate-passed S. 2102, to Committee on Merchant Marine and Fisheries.

GATT TRADE NEGOTIATIONS: Senate June 29, 1966, agreed to S. Con. Res. 100, which expresses the sense of Congress that no agreement for the reduction of duties be entered into by the executive branch, unless authorized under present law, without the prior approval of Congress. An excerpt from the committee report (No. 1341) was inserted in Congressional Record, June 29, 1966 (pp. 14042-14048).

ICNAF PROTOCOLS: Senate June 27, 1966, received two treaties (Executive I), 89th Congress, 2nd session. Protocol to the International Convention for the Northwest Atlantic Fisheries relating to measures of control; and Protocol to the International Convention for the Northwest Atlantic Fisheries relating to entry into force of proposals adopted by the Commission. Sen. Bartlett (Congressional Record, June 27, 1966, pp. 13719-13720) asked unanimous consent that the injunction of secrecy be removed from the above-mentioned Protocols. He also inserted in the Record the text of the President's message transmitting these Protocols.

Senate Committee on Foreign Relations July 12, 1966, met in executive session and approved Protocols to the International Convention for the Northwest Atlantic Fisheries (Ex. I, 89th Cong., 2nd Sess.).

INTERIOR DEPARTMENT APPROPRIATIONS FY 1967: House June 22, 1966, received a communication from the President of the United States, transmitting an amendment to the request for appropriations for the Department of the Interior for fiscal year 1967; referred to Committee on Appropriations.

NATIONAL SEA GRANT COLLEGES AND PROGRAM ACT OF 1965: Sea Grant Colleges: Hearings before the Special Subcommittee on Sea Grant Colleges of the Committee on Labor and Public Welfare, United States

Senate, 89th Congress, 2nd session on S. 2439, a bill to amend the National Science Foundation Act of 1950, as amended, so as to authorize the establishment and operation of Sea Grant Colleges and programs by initiating and supporting programs of education, training, and research in the marine sciences and a program of advisory services relating to activities in the marine sciences, to facilitate the use of the submerged lands of the outer Continental Shelf by participants carrying out these programs, and for other purposes. May 2, 1966--Kingston, R. I., May 3, 4, and 5, 1966--Washington, D. C., 291 pp., printed. Contents include text, Interior Departmental Report, statements and communications from various Federal and state officials, members of Congress, University representatives and business representatives.

The Committee on Labor and Public Welfare, June 24, 1966, reported (S. Rept. 1397), with amendments, S. 2439, the proposed National Sea Grant Colleges and Program Act.

NATIONAL WATER COMMISSION ACT: S. Rept. 1212, National Water Commission (June 8, 1966, report with additional views from the Committee on Interior and Insular Affairs, U. S. Senate, 89th Congress, 2nd session, to accompany S. 3107), 11 pp., printed. Committee reported favorably with amendments. Discusses background, need, mission, composition, amendments, and major provisions of the bill.

NATURAL RESOURCES DEPARTMENT: H. R. 15795 (Moorhead) introduced in House June 15, 1966, to redesignate the Department of the Interior as the Department of Natural Resources and to transfer certain agencies to and from such Department; to Committee on Government Operations.

NORTHWEST ATLANTIC FISHERIES ACT AMENDMENT: Both Houses July 11, 1966, received a letter from the Assistant Secretary for Congressional Relations, Department of State, transmitting a report of the ratification of the amendment to the Northwest Atlantic Fisheries Act of 1950 (P. L. 845, 81st Congress), by 11 of the 13 parties to the convention: referred to House Committee on Foreign Affairs, and Senate Committee on Commerce.

OCEAN EXPLOITATION: Sen. Bartlett inserted in Congressional Record, July 11, 1966 (pp. 14438-14439), an address given by Secretary of the Interior Stewart L. Udall on June 28, before the Marine Technology Society Conference in Washington, D. C., entitled "Exploiting the Ocean."

OCEANOGRAPHIC AGENCY OR COUNCIL: S. 944, the Marine Resources and Engineering Act of 1966 was signed by the President June 17, 1966, P. L. 89-454.

Rep. Rogers spoke in the Senate (Congressional Record, June 23, 1966, p. 13372), commending the President for signing into law S. 944, the Marine Resources and Engineering Development Act of 1966. He stated that the Presidential Commission, which the bill contains, marks the first time a working dialogue will be established between Government, industry, and the academic community in the field of oceanography.

OCEANOGRAPHY: Sen. Fong inserted in Congressional Record, June 29, 1966 (pp. 14058-14059), a press release describing the purposes and plans of the National Oceanography Association and listing the Board of Directors of the Association.

OIL POLLUTION OF THE SEA: H. Rept. 1620, Implementing Provisions of the International Convention for the Prevention of the Pollution of the Sea by Oil, 1954 (June 8, 1966, report from the Committee on Merchant Marine and Fisheries, House of Representatives, 89th Congress, 2nd session, to accompany H. R. 8760), 19 pp., printed. Committee reported bill favorably without amendment. Discusses purpose and major provisions of the bill, and changes in existing law.

H. R. 15670 (Murphy of N. Y.) introduced in House June 14, 1966, to amend the provisions of the Oil Pollution Act, 1961 (33 U.S.C. 1001-1015), to implement the provisions of the International Convention for the Prevention of the Pollution of the Sea by Oil, 1954, as amended, and for other purposes; to Committee on Merchant Marine and Fisheries.

House June 20, 1966, sent to Senate without amendment H. R. 8760.

PESTICIDES: Sen. Ribicoff spoke in the Senate (Congressional Record, June 29, 1966, p. 14074) expressing his concern with reports that the Public Health Service is abolishing its Office of Pesticides. He expressed his hope that the proper officials will give this situation very serious consideration because the success of programs depends often on their status and prestige in an organizational framework.

SEA GRANT COLLEGES: H. R. 15636 (Keith), H. R. 15641 (Reinecke) introduced in House June 13, 1966, and H. R. 15671 (Ryan), June 14, 1966, to amend title II of the Merchant Marine Act, 1936, to authorize the establishment and operation of sea grant colleges and certain education, training and research programs; to Committee on Merchant Marine and Fisheries.

Subcommittee on Oceanography of House Committee on Merchant Marine and Fisheries June 13, 1966, held hearing on H. R. 15192 and related bills. Among others, testimony was heard from Dr. Thomas F. Bates, Science Advisor to the Secretary of the Interior. Adjourned subject to call.

TRADE AGREEMENT: Sen. Hruska inserted in Congressional Record, June 23, 1966 (pp. 13488-13500), numerous editorials and news stories, commending Rep. Curtis' unique contribution to the Kennedy Round tariff negotiations. He also inserted the full text of Rep. Curtis' May 31, 1966, report on these negotiations. "ASP and Canned Clams" appears on page 13497.

VESSEL MEASUREMENT: H. Rept. 1618, Admeasurement of Small Vessels (June 7, 1966, report from the Committee on Merchant Marine and Fisheries, House of Representatives, 89th Congress, 2nd session to accompany S. 2142), 8 pp., printed. Committee reported bill favorably without amendment. Discusses purpose and changes in existing law.

House June 20, 1966, passed S. 2142, to simplify the admeasurement of small vessels; thus clearing the bill for the President's signature.

S. 2142 was signed by the President June 29, 1966 (P. L. 89-476).

WATER POLLUTION CONTROL ACT: H. R. 15635 (Hanley) introduced in House June 13, 1966, to amend the Federal Water Pollution Control Act in order to improve the programs under such act; to Committee on Public Works.

Senate Committee on Public Works July 11, 1966, reported (S. Rept. 1367) with amendment on S. 2947.

House Committee on Public Works July 12, 1966, held a hearing on H. R. 13104, the Clean Rivers Restoration Act of 1966; and H. R. 16076, and related bills, to amend the Federal Water Pollution Control Act in order to improve and make more effective certain programs pursuant to such act. Testimony was heard from Stewart L. Udall, Secretary of the Interior; and James M. Quigley, Commissioner, Federal Water Pollution Control Administration, Department of the Interior.

Senate July 13, 1966, passed with committee amendment (in the nature of a substitute) S. 2947, to amend the Federal Water Pollution Control Act in order to improve and make more effective certain programs pursuant to such act.

Sen. Muskie (Congressional Record, July 13, 1966, pp. 14869-14887) stated this bill can be considered the first omnibus water pollution control act. It extends and broadens the existing program; provides a new emphasis in the clean rivers concept; strengthens other existing law, including the Oil Pollution Act of 1924; and manifests the total commitment of the Federal Government to abatement of the pollution of one of the Nation's most vital resources.

There are several amendments to the Federal Water Pollution Control Act, one of which provides that Section 5 of the Federal Water Pollution Control Act is amended to authorize a comprehensive study of the effects of pollution. . . . Another amendment to the Federal Water Pollution Control Act adds, among other things, a new section 18, "Study of pollution from boats and vessels."

H. R. 16230 (Schmidhauser) introduced in House July 13, 1966, to amend the Federal Water Pollution Control Act in order to improve and make more effective certain programs pursuant to such act; to Committee on Public Works.

WATER RESOURCE PROPOSALS--FEASIBILITY INVESTIGATIONS: House Committee on Interior and Insular Affairs June 15, 1966, met in open session and ordered reported favorably H. R. 13419 (amended), to authorize the Secretary of the Interior to engage in feasibility investigations of certain water resource development proposals.

House Committee on Interior and Insular Affairs June 30, 1966, reported (H. Rept. 1686), with amendments H. R. 13419.

H. Rept. 1686, Authorizing the Secretary of the Interior to Engage in Feasibility Investigations of Certain Water Resource Development Proposals (June 30, 1966, report from the Committee on Interior and Insular Affairs, House of Representatives, 89th Congress, 2nd session, to accompany H. R. 13419), 19 pp., printed. Committee reported favorably with amendments. Discusses purpose, need, cost, analysis of the legislation, executive communications, committee recommendations.

Senate Committee on Interior and Insular Affairs, July 11, 1966, reported (S. Rept. 1368), with amendment, on S. 3034, to authorize the Secretary of the Interior to engage in feasibility investigations of certain water resource development proposals.

Senate July 12, 1966, passed with committee amendments S. 3034, to authorize feasibility investigations of certain water resource development proposals.

WETLANDS RECREATION AREA FOR FISH AND WILDLIFE: Introduced in House H. R. 15770 (Tenzer), June 16, 1966; H. R. 16148 (Kelly), July 12; to provide for the protection, conservation, and development of the natural coastal wetlands of Hempstead-South Oyster Bay, Long Island, for fish and wildlife and outdoor recreation purposes, and for other purposes; to Committee on Merchant Marine and Fisheries. Rep. Tenzer in extension of his remarks (Congressional Record, June 16, 1966, p. A3266) stated that this bill incorporates the amendments proposed at hearings held on H. R. 11236 (introduced Sept. 23, 1965), and related bills, to establish a Long Island National Wetlands Recreation Area. These amendments are designed to improve the provisions of the bill.

Subcommittee on Fisheries and Wildlife Conservation of House Committee on Merchant Marine and Fisheries June 22, 1966, continued hearings on H. R. 11236, and related bills. Testimony was heard from Stanley A. Cain, Assistant Secretary of Interior for Fish and Wildlife and Parks.

H. R. 16008 (Wydler) introduced in House June 28, 1966, to provide for the establishment of a study commission to consider methods for conserving, protecting, and developing the Long Island Wetlands Conservation Area; to Committee on Merchant Marine and Fisheries.

WORLD HUNGER: Senate June 13, 1966, referred H. R. 14929 to Senate Committee on Agriculture and Forestry.

Food for Freedom Program and Commodity Reserves: Hearings before the Committee on Agriculture and Forestry, United States Senate, 89th Congress, 2nd session on S. 2157, S. 2826, S. 2933, S. 2995 and H. R. 14929, bills to promote international trade in agricultural commodities to combat hunger and malnutrition, to further economic development, to establish and maintain reserves of agricultural commodities to pro-

tect consumers, and for other purposes, Mar. 2, 3, 4, 7, 8, and June 15, 1966, 518 pp., printed. Contents include miscellaneous documents and statements of various Federal and state officials; business representatives and members of Congress.

Senate Committee on Agriculture and Forestry June 15, 1966, held hearings on H. R. 14929, proposed Food for Freedom Act. Hearings were adjourned subject to call.

Senate Committee on Agriculture and Forestry met June 28, 1966, to consider H. R. 14929, proposed Food for Freedom Act.

Sen. McGovern spoke in the Senate and inserted in Congressional Record, June 30, 1966 (pp. 14153-14154), the text of a resolution adopted in May 1966 by the International Federation of Agricultural Producers, on world economic development and world food policy. He stated this resolution reflects a growing consensus on the sort of war against want which he proposed in the International Food and Nutrition Act, and which is now embodied in the food-for-freedom bill pending before the Senate Agriculture Committee.

Rep. Quie spoke in the House (Congressional Record, July 12, 1966, pp. 15063-15064) voicing his objection to the amendment which was adopted by the House to the Food for Freedom Act on June 9, 1966, which would permit fish concentrate to be exported under Public Law 480 without prior approval from the Food and Drug Administration. He inserted excerpts from an article which appeared in a recent issue of the New Zealand Dairy Exporter by Sir Ernest Manden, fellow of the Royal Society and elder statesman of science in New Zealand, and stated that Manden's observations command more than passing note.

NOTE: REPORT ON FISHERY ACTIONS IN 89TH CONGRESS: The U. S. Department of Interior's Bureau of Commercial Fisheries has issued a leaflet on the status of most legislation of interest to commercial fisheries at the end of the 1st session of the 89th Congress. For copies of MNL--3 "Legislative Actions Affecting Commercial Fisheries, 89th Congress, 1st Session 1965," write to the Fishery Market News Service, U. S. Bureau of Commercial Fisheries, 1815 N. Fort Myer Drive, Rm. 510, Arlington, Va. 22209.

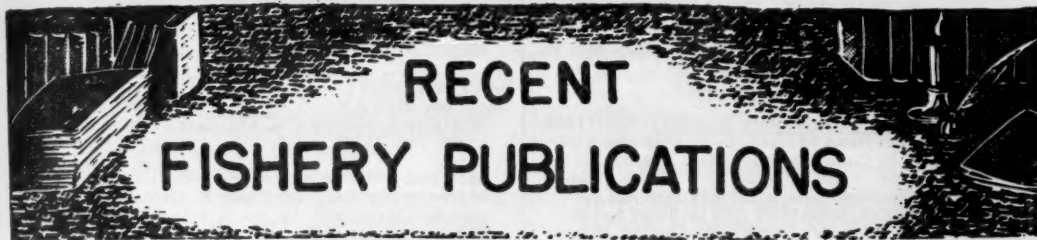


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P. 1--F. B. Sanford and C. F. Lee; pp. 56, 57 (fig. 3, upper left), 59 (left), 66, 67 and 68 (fig. 1)--R. S. Croker; pp. 57 (figs. 1-3) and 58 (fig. 4)--France Pêche, Lorient; p. 58 (figs. 5-8)--Marchés du Poisson; p. 59 (right)--Consulate General of Japan, N. Y.; p. 68 (fig. 2)--John Barrett; p. 78 (figs. 3 & 5) and 79 (figs. 6 & 7)--U. S. Coast Guard.



FISH AND WILDLIFE SERVICE PUBLICATIONS

THESE PROCESSED PUBLICATIONS ARE AVAILABLE FREE FROM THE OFFICE OF INFORMATION, U. S. FISH AND WILDLIFE SERVICE, WASHINGTON, D. C. 20402. TYPES OF PUBLICATIONS ARE DESIGNATED AS FOLLOWS:

CFS - CURRENT FISHERY STATISTICS OF THE UNITED STATES.
SEP. - SEPARATES (REPRINTS) FROM COMMERCIAL FISHERIES REVIEW.

- | Number | Title |
|----------|---|
| CFS-4054 | - Frozen Fishery Products, 1965 Annual Summary, 15 pp. |
| CFS-4080 | - Frozen Fishery Products, March 1966, 8 pp. |
| CFS-4115 | - Maine Landings, February 1966 (Revised), 4 pp. |
| CFS-4117 | - North Carolina Landings, March 1966, 4 pp. |
| CFS-4119 | - Georgia Landings, March 1966, 3 pp. |
| CFS-4120 | - Frozen Fishery Products, April 1966, 8 pp. |
| CFS-4122 | - Fish Sticks, Fish Portions, and Breaded Shrimp, January-March 1966, 4 pp. |
| CFS-4123 | - Florida Landings, 1965 Annual Summary, 18 pp. |
| CFS-4125 | - California Landings, February 1966, 4 pp. |
| CFS-4126 | - North Carolina Landings, 1965 Annual Summary, 9 pp. |
| CFS-4128 | - Alabama Landings, March 1966, 3 pp. |
| CFS-4129 | - Louisiana Landings, February 1966, 3 pp. |
| CFS-4130 | - Texas Landings, February 1966, 2 pp. |
| CFS-4131 | - North Carolina Landings, April 1966, 4 pp. |
| CFS-4132 | - Fish Meal and Oil, April 1966, 2 pp. |
| CFS-4133 | - Georgia Landings, 1965 Annual Summary, 9 pp. |
| CFS-4134 | - Maryland Landings, March 1966, 4 pp. |
| CFS-4136 | - New Jersey Landings, March 1966, 3 pp. |
| CFS-4139 | - Maine Landings, March 1966, 4 pp. |
| CFS-4140 | - Massachusetts Landings, 1965 Annual Summary, 15 pp. |
| CFS-4142 | - Florida Landings, April 1966, 8 pp. |
| CFS-4151 | - Georgia Landings, April 1966, 3 pp. |
| CFS-4152 | - Louisiana Landings, March 1966, 3 pp. |
| CFS-4157 | - California Landings, March 1966, 4 pp. |

Sep. No. 765 - Species Composition of the North Carolina Industrial Fish Fishery.

Sep. No. 766 - The South Pacific Albacore Long-Line Fishery, 1954-64.

THE FOLLOWING PUBLICATIONS ARE AVAILABLE ONLY FROM THE SPECIFIC OFFICE MENTIONED:

California Fishery Market News Monthly Summary, Part I - Fishery Products Production and Market Data, May 1966, 15 pp. (Market News Service, U. S.

Fish and Wildlife Service, Post Office Bldg., San Pedro, Calif. 90731.) California cannery receipts of tuna and tunalike fish and other species used for canning; pack of canned tuna, tunalike fish, sardines, mackerel, and anchovies; market fish receipts at San Pedro, Santa Monica, and Eureka areas; California and Arizona imports; canned fish and frozen shrimp prices; ex-vessel prices for cannery fish; prices for fish meal, oil, and solubles; for the month indicated.

California Fishery Market News Monthly Summary, Part II - Fishing Information, May 1966, 19 pp., illus. (U. S. Bureau of Commercial Fisheries, Tuna Resources Laboratory, P. O. Box 271, La Jolla, Calif. 92038.) Contains sea-surface temperatures, fishing and research information of interest to the West Coast tuna-fishing industry and marine scientists; for the month indicated.

Middle Atlantic Fishery Trends--Monthly Summary-- April 1966, 16 pp. (Market News Service, U. S. Fish and Wildlife Service, 346 Broadway, Rm. 1003, New York, N. Y. 10013.) A review and analysis of New York City's wholesale fishery trade--receipts, landings, prices, imports, stocks, and market trends; and trends in the fisheries of the New York Marine District, New Jersey and Delaware Bay areas; for the month indicated.

Monthly Summary of Fishery Products Production in Selected Areas of Virginia, North Carolina, and Maryland, May 1966, 4 pp. (Market News Service, U. S. Fish and Wildlife Service, 18 S. King St., Hampton, Va. 23369.) Landings of food fish and shellfish and production of crab meat and shucked oysters for the Virginia areas of Hampton Roads, Chincoteague, Lower Northern Neck, and Lower Eastern Shore; the Maryland areas of Crisfield, Cambridge, and Ocean City; and the North Carolina areas of Atlantic, Beaufort, and Morehead City; together with cumulative and comparative data on fishery products and shrimp production; for the month indicated.

New England Fisheries--Annual Summary, 1965, by John J. O'Brien and Henry R. McAvoy, 38 pp., illus., May 1966. (Market News Service, U. S. Fish and Wildlife Service, 10 Commonwealth Pier, Boston, Mass. 02210.) Reviews the fishery marketing trends and conditions at the principal New England ports, and highlights of the Canadian fisheries. The latest developments in the purse-seine tuna and swordfish long-line fisheries, fish meal market, and frozen fishery products are recounted. Also includes fishery landings and ex-vessel prices for the ports of Boston, Gloucester, New Bedford, and Provincetown,

Mass., Portland and Rockland, Me., Point Judith, R.I., Stonington, Conn.; and principal events in the Maine sardine fishery. In addition, contains data on monthly landings and ex-vessel prices by species, at Boston and Atlantic Ave. fish piers.

New England Fisheries--Monthly Summary, April 1966, 19 pp. (Market News Service, U. S. Fish and Wildlife Service, 10 Commonwealth Pier, Boston, Mass. 02210.) Review of the principal New England fishery ports. Presents data on fishery landings by ports and species; industrial fish landings and ex-vessel prices; imports; cold-storage stocks of fishery products in New England warehouses; fishery landings and ex-vessel prices for ports in Massachusetts (Boston, Gloucester, New Bedford, Provincetown, and Woods Hole), Maine (Portland and Rockland), Rhode Island (Point Judith), and Connecticut (Stonington); frozen fishery products prices to primary wholesalers at Boston, Gloucester, and New Bedford; and Boston Fish Pier and Atlantic Avenue fishery landings and ex-vessel prices by species; for the month indicated.

(Seattle) Washington and Alaska Receipts and Landings of Fishery Products for Selected Areas and Fisheries, Monthly Summary, May 1966, 9 pp. (Market News Service, U. S. Fish and Wildlife Service, 706 New Federal Office Bldg., 909 First Ave., Seattle, Wash. 98104.) Includes landings by the halibut fleet reported by the Seattle Halibut Exchange; salmon landings reported by primary receivers; landings of halibut reported by the International Pacific Halibut Commission; landings of otter-trawl vessel receipts reported by the Fishermen's Marketing Association of Washington; local landings by independent vessels; coastwise shipments from Alaska by scheduled and nonscheduled shipping lines and airways; imports from British Columbia via rail, motor truck, shipping lines, and ex-vessel landings; and imports from other countries through Washington Customs District for the month indicated.

THE FOLLOWING SERVICE PUBLICATION IS FOR SALE AND IS AVAILABLE ONLY FROM THE SUPERINTENDENT OF DOCUMENTS, U. S. GOVERNMENT PRINTING OFFICE, WASHINGTON, D. C. 20402.

Progress in Sport Fishery Research, 1965, Resource Publication 17, 124 pp., illus., processed, Mar. 1966, 60 cents.

MISCELLANEOUS PUBLICATIONS

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM. CORRESPONDENCE REGARDING PUBLICATIONS THAT FOLLOW SHOULD BE ADDRESSED TO THE RESPECTIVE ORGANIZATION OR PUBLISHER MENTIONED. DATA ON PRICES, IF READILY AVAILABLE, ARE SHOWN.

ANCHOVY:

"Anchovy," by John Radovich, article, Outdoor California, vol. 27, no. 4, April 1966, pp. 5-8, 15, illus., printed. State of California, Office of Procurement, Documents Section, P. O. Box 1612, Sacramento, Calif. 95807. Historical summary of the anchovy fishery.

AUSTRALIA:

Synopsis of Biological Data on the Grey Mullet (MUGIL CEPHALUS Linnaeus 1758), by J. M. Thomson, Fisheries Synopsis No. 1, 75 pp., illus., processed,

June 1963. Division of Fisheries and Oceanography, Commonwealth Scientific and Industrial Research Organization, Cronulla, Sydney, Australia.

BACTERIOLOGY:

Articles from Applied Microbiology, printed. The Williams & Wilkins Co., 428 East Preston St., Baltimore, Md. 21202:

"Bacterial pollution indicators in the intestinal tract of freshwater fish," by Edwin E. Geldreich and Norman A. Clarke, vol. 14, no. 3, May 1966, pp. 429-437, illus., single copy \$3.00.

"Bacteriology of spoilage of fish muscle. III--Characterization of spoilers," by Peter Lerke, Ralph Adams, and Lionel Farber, vol. 13, July 1965, pp. 625-630.

"Effect of heating on *Staphylococcus aureus* in frozen precooked seafoods," by G. Houghtby and J. Liston, article, Food Technology, vol. 19, May 1965, pp. 192-195, printed. Institute of Food Technologists, Special Services Office, 510 North Hickory St., Champaign, Ill. 61820.

BRAZIL:

A Pesca no Nordeste (The fishery in the northeast), edited by J. M. Brandão, SUDENE GCDP Documentação 1966 DOP-4, 51 pp., printed in Portuguese, 1966. Grupo Coordenador do Desenvolvimento da Pesca (GCDP), SUDENE, Cais de Santa Rita, Edifício do Entrepósito Federal de Pesca, Recife, Pernambuco, Brasil.

BRISLING:

"Las conservas de 'brisling' noruegas" (Conservation of Norwegian 'brisling'), article, Industria Conservera, vol. XXI, no. 313, July 1965, pp. 191-192, illus., printed in Spanish, single copy 25 ptas. (about US\$0.40). Industria Conservera, Calle Marques de Valladares, 41, Vigo, Spain.

CALIFORNIA:

California Fish and Game, vol. 52, no. 2, Apr. 1966, pp. 67-128, illus., printed, single copy 75 cents. Office of Procurement, Documents Section, P. O. Box 1612, Sacramento, Calif. 95807. Some of the articles are: "An early hepatoma epizootic in rainbow trout, *Salmo gairdnerii*," by J. H. Wales and R. O. Sinnhuber; "Annotated list of fishes collected by midwater trawl in the Gulf of California, March-April 1964," by Robert J. Lavenberg and John E. Fitch; "Fecundity of the Pacific hake *Merluccius productus* (Ayers)," by John S. MacGregor; "A sexually abnormal red crab, *Cancer productus* Randall," by Richard Poole; and "Sea lion census for 1965 including counts of other California Pinnipeds," by John G. Carlisle, Jr., and J. A. Aplin.

CANADA:

Fisheries Statistics British Columbia and Yukon; La Statistique des Pêches Colombie-Britannique et Yukon; 1964, Catalogue no. 24-208 annual, 18 pp., illus., printed in English and French, May 1966, C\$0.50. Queen's Printer and Controller of Stationery, Ottawa, Canada.

Fisheries Statistics of British Columbia 1965 (Preliminary), 12 pp., processed, April 1966. Canadian Department of Fisheries in Vancouver, Area Director of Fisheries, 1155 Robson St., Vancouver 5, B.C.

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

CANNED FISH

A Note to the Fishing Industry and General Public on Sulphide Discoloration ("Smut") in Canned Fishery Products, by P. M. Jangaard, New Series Circular No. 22, 1 p., September 17, 1965. Fisheries Research Board of Canada, Halifax Laboratory, Halifax, Nova Scotia, Canada.

CHILE

Inversiones y Capacidad de Producción en la Industria de Harina de Pescado en el Norte de Chile. Un Modelo Matemático Para su Racionalización. (Investments and Production Capacity of Northern Chile's Fish Meal Industry. A Mathematical Model for its Rationalization), by Maris Liebeschütz and Hector Aliaga, Publicación No. 15, 61 pp. illus., printed in Spanish with English summary, 1966. Library, Instituto de Fomento Pesquero, Pedro de Valdivia 2633, Casilla 1287, Santiago, Chile. A comprehensive economic study of the fish meal industry of northern Chile through 1965.

"Primera campaña Chilena para popularizar las conservas de atún" (First Chilean promotion to popularize canned tuna), article, Información Conservera, vol. XIV, no. 147, March 1966, pp. 58-61, printed in Spanish. Información Conservera, Garrigues 21, Valencia 1, Spain.

CHILLING

Superchilling, Research and Development Bulletin No. 16, 2 pp., processed, November 1965. White Fish Authority, Lincoln's Inn Chambers, 2/3 Curd Street, London EC4, England.

CLAMS

Economics of Quahog Depuration, by Andreas Holmsten and Joseph Stanislaw, Bulletin No. 384, 33 pp., illus., printed, 1966. Department of Food and Resource Economics, University of Rhode Island, Agricultural Experiment Station, Kingston, R. I. 02881. Pollution of our coastal waters has been increasing and because of the health hazard, many of these areas are closed for shellfishing. In the laboratory, the use of ultraviolet light to purify hard-shell clams from polluted waters has proven successful from a biological point of view, but no plant has yet been designed to utilize this method for hard clams. This study deals with the technical and economic aspects of depuration (purification), including design of a processing plant, design of equipment, and an analysis of the economic feasibility of this method as compared with the present method of transplanting from polluted to clean waters.

COLD STORAGE

A Note to the Industry on Superchilled Storage of Cod, by H. E. Power and M. L. Morton, New Series Circular No. 23, 2 pp., processed, Oct. 27, 1965. Fisheries Research Board of Canada, Halifax Laboratory, Halifax, Nova Scotia, Canada.

CONSERVATION

Federal Aid in Fish and Wildlife Restoration (Annual Report on Dingell-Johnson and Pittman-Robertson Programs for the Fiscal Year Ending June 30, 1965), 95 pp., illus., printed, 1966. Sport Fishing Institute, Bond Bldg., Washington, D. C. 20005. Presents a short program review of expenditures and projects (including sport fish restoration) operated during

FY 1965, and statistical tables on individual conservation projects, land purchases, hunting and fishing licenses issued by the states, and other related data.

CURED FISH

"Sweet cured freshwater fish slices," by A. W. Lantz and D. G. Iredale, article, Trade News, vol. 18, no. 10-11, April-May 1966, pp. 8-9, illus., printed. Director of Information and Educational Service, Department of Fisheries, Ottawa 8, Canada.

DEHYDRATION

"Development of dehydrated meat and fish salads for military use," by J. M. Tuomy, article, Food Technology, vol. 19, no. 6, pp. 46, 50, June 1965. Institute of Food Technologists, Suite 1350, 176 West Adams St., Chicago, Ill. 60603.

DOLPHIN

"Communication between dolphins in separate tanks by way of an electronic acoustic link," by T. G. Lang and H.A.P. Smith, article, Science, vol. 150, no. 3705, Dec. 31, 1965, pp. 1786-1789, illus., printed, single copy 35 cents. American Association for the Advancement of Science, 1515 Massachusetts Ave. NW., Washington, D. C. 20005. Two isolated dolphins (*Tursiops truncatus*) were provided with an electronic acoustic link during alternate periods of approximately 2 minutes. The dolphin repeatedly communicated in a tight sequence when the acoustic link was connected. Their responses varied as the experiment progressed. Some information regarding possible meaning of the whistles was obtained.

ECOLOGY

Ecological Studies of the Sacramento-San Joaquin Estuary. Part I--Zooplankton, Zoobenthos, and Fishes of San Pablo and Suisun Bays, Zooplankton and Zoobenthos of the Delta, compiled by D. W. Kelley, Fish Bulletin 133, 133 pp., illus., printed, 1966. Office of Procurement, Documents Section, P. O. Box 1612, Sacramento, Calif. 95807.

ELECTRICAL FISHING

"Una útil aplicación de la electricidad en la pesca" (A useful application of electricity for catching fish), article, Mar. & Pesca, vol. 2, November 1965, pp. 14-15 illus., printed in Spanish. Mar. & Pesca, Amargura 103 esq. a San Ignacio, Havana, Cuba.

FISH

The Life of Fishes, by N.B. Marshall, 402 pp. + 43 plates, illus., printed, 1965, 63s. net (US\$8.85). Weidenfeld and Nicolson, London, England.

FISHERY MANAGEMENT

"There are obstacles between abundance and fishing profits," article, Fishing Gazette, vol. 82, May 1965, pp. 18-19, 30-31, printed. Fishing Gazette Publishing Corp., 461 Eighth Ave., New York, N.Y. 10001.

FISH MUSCLE

"Phospholipids of menhaden muscle," by John R. Froines, C. Yvonne Shuster, and Harold S. Olcott, article, Journal of the American Oil Chemists' Society, vol. 42, Oct. 1965, pp. 887-888, printed. American Oil Chemists' Society, 35 E. Wacker Drive, Chicago, Ill. 60601.

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FOOD AND AGRICULTURE ORGANIZATION

Articles available from Food and Agriculture Organization of the United Nations, Viale delle Terme di Caracalla, Rome, Italy:

Proceedings and Basic Working Papers of the Technical Meeting on Fishery Cooperatives (Naples, May 12-21, 1959), 1963, printed.

Report to the Government of India on Fishing Harbor Project at Vizhinjam, by Hermann A. Selmer, FAO Fisheries Report No. 1845, 30 pp., processed, 1964.

FRANCE

Rapport sur la Production de l'Industrie des Pêches Maritimes en 1965 (Report on the Production of the Maritime Fishing Industry in 1965), 76 pp., illus., processed in French, 1966. Comité Central des Pêches Maritimes, Paris, France.

"Técnicas francesas de fabricación de conservas de atún" (French techniques for packing canned tuna), article, Información Conservera, vol. XIV, no. 147, March 1966, pp. 67-70, printed in Spanish. Información Conservera, Garrigues, 21, Valencia 1, Spain.

FREEZE-DRYING

A Note to the Industry on Freeze-Drying, by A. L. Wood, New Series Circular No. 24, 2 pp., processed, Oct. 27, 1965. Fisheries Research Board of Canada, Halifax Laboratory, Halifax, Nova Scotia, Canada.

FRESH-WATER FISH

Fresh-Water Fish and Fishing in Africa, by A. C. Harrison and others, 210 pp., illus., printed, 1963. Cape and Transvaal Printers Ltd., Cape Town, South Africa. (Available from Thomas Nelson and Sons, 18 E. 41st. St., New York, New York, 10017.)

GENERAL

"Demand for fishery products must be demonstrated," by Donald L. McKernan, article, Fish Boat, vol. 10, Feb. 1965, pp. 14-15, printed, Fish Boat, H. L. Peace Publications, 624 Gravier St., New Orleans, La. 70150.

HAKE

"Phospholipids of marine origin. I.--The hake (Merluccius capensis, Castelnau)," by A. J. de Koning, article, Journal of the Science of Food and Agriculture, vol. 17, no. 3, March 1966, pp. 112-117, printed, single issue £1 17s. 6d. (US\$5.27). Society of Chemical Industry, 14 Belgrave Square, London, SW1, England.

HERRING

"The Atlantic herring," by S. N. Tibbo and R. D. Humphreys, article, Trade News, vol. 18, no. 5, Nov. 1965, pp. 6-9, illus., printed. Director, Information and Consumer Service, Department of Fisheries, Ottawa, Canada.

HIGH-SEAS FISHING

"Peaceful co-existence on the high seas," by J. L. Kask, article, Fishing News Information, vol. 4, no. 4, Oct.-Dec. 1965, pp. 413-414, illus., printed, single copy 3s.6d. (about 50 U.S. cents), Arthur J. Heighway Publications Ltd., Ludgate House, 110 Fleet St., London EC4, England.

INDIA

Seafood Trade Journal, vol. 1, no. 4, April 1966, 46 pp., illus., printed in English. The Seafood Canners' and Freezers' Association of India, Cochín, India. Includes articles on "Export of Indian seafood," pp. 5-9; "Fisheries of Goa," by V. P. Kale, pp. 13-17; "International Fisheries Ltd.," pp. 21-27; "Indian shrimp in Australia," pp. 29-31.

IRRADIATION

"Microbial flora of irradiated Dungeness crabmeat and Pacific oysters," by Maureen A. Shiflett, J. S. Lee, and R.O. Sinnhuber, article, Applied Microbiology, vol. 14, no. 3, May 1966, pp. 411-415, illus., printed, single copy \$3.00. The Williams & Wilkins Co. 428 E. Preston St., Baltimore, Md. 21202.

JAPAN

Bulletin of Tokai Regional Fisheries Research Laboratory, no. 44, 59 pp., illus., printed in Japanese with English summaries, Oct. 1965. Tokai Regional Fisheries Research Laboratory, 5-Chome, Kachidoki, Chuo-Ku, Tokyo, Japan. Some of the articles are: "On the prediction of future catches of yellowtails caught by set nets at Kuki in Mie Prefecture from techniques of time series," by Takeyuki Doi; "Separation of unsaponifiable components of deep-sea shark liver oil by chromatography on florisil," by Yaichiro Shimma and Hisako Taguchi; and "The effect of adjustment of pH of the washing medium on the jelly forming ability of fish meat," by Minoru Okada, Kazushi Iwata, and Noriaki Suzuki.

History of Modern Fisheries Development, By Nobuo Okamoto, 614 pp., printed in Japanese, Mar. 1964, 2,300 yen (about US\$6.38), postage extra, Suisansha, 8-banchi, Sanei-cho, Shinjuku-ku, Tokyo, Japan. Summarizes the development and present status of the different fisheries, the founding of fishing companies and fisheries organizations, development of foreign trade, etc.

Hokusuishi Geppo (Monthly Report of the Hokkaido Regional Fisheries Research Laboratory), vol. 23, no. 4, 40 pp., printed in Japanese, April 1966, 100 yen (about US\$0.28). Hokkaido Regional Fisheries Research Laboratory, 238-banchi, Hamanaka-cho, Yoichi, Hokkaido, Japan. Some of the articles are: "Fishes of the nearby seas of Hokkaido, part 15--eels"; "The tuna fisheries of Kutsukata, Rishiri Island"; "Bottom trawl nets of Hokkaido"; and "Changes in the putrefaction process of organic waters."

"Japan--modern development of the fishing industry," by Norio Fujinami, article, Fishing News International, vol. 4, no. 4, Oct.-Dec. 1965, pp. 405-407, illus., printed, single copy 3s. 6d. (about 50 U.S. cents). Arthur J. Heighway Publications Ltd., Ludgate House, 110 Fleet St., London EC4, England.

LAW OF THE SEA

Ocean Sciences, Technology, and the Future International Law of the Sea, by William T. Burke, Pamphlet No. 2, 91 pp., printed, January 1966, \$1.50. Ohio State University Press, Athens, Ohio, 45701. Objectives of this discussion are to offer a preliminary, and necessarily brief, examination of

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the changes in the age-old process of interaction on the oceans that account in measure for the emergence of novel problems in regulation; to seek to identify some of the new problems by speculating about the types of future claims and counterclaims that will differ from those encountered in previous experience; and to make a short, rather general, survey of the broad outlines of the legal technicality inherited from the past that modern decision-makers might adopt, wisely or not, as useful for resolving disputes in the future. No systematic effort is made to clarify community policies at stake in the emerging struggle over the sea, though brief suggestions are made about the direction of further research of some problems.

LOBSTER

"Lobster transplant in B. C.," by Bruce Woodland, article, Trade News, vol. 18, no. 10-11, April-May, 1966, pp. 3-6, illus., printed. Director of Information and Educational Service, Department of Fisheries.

MACKEREL

"The Atlantic mackerel," by R. D. Humphreys and S. N. Tibbo, article, Trade News, vol. 18, no. 5, Nov. 1965, pp. 15-17, illus., printed. Director, Information and Consumer Service, Department of Fisheries, Ottawa, Canada.

MARINE BIOLOGY

The Biological Bulletin, vol. 130, no. 2, April 1966, illus., printed, single copy \$3.75. The Biological Bulletin, Marine Biological Laboratory, Woods Hole, Mass. Contains, among others, articles on: "Factors affecting activity and burrowing habits of the pink shrimp, *Penaeus duorarum* Burkenroad" by Charles M. Fuss, Jr., and Larry H. Ogren; "Respiration during the reproductive cycle in the sea urchin, *Strongylocentrotus purpuratus*," by A. C. Giese and others; "Time and intensity of setting of the oyster, *Crassostrea virginica*, in Long Island Sound," by Victor L. Loosanoff; "Aerial respiration in the longjaw mudsucker *Gillichthys mirabilis* (Teleostei: gobiidae)," by Eric S. Todd and Alfred W. Ebeling; and "*Caprella grahami*, a new species of caprellid (Crustacea: amphipoda) commensal with starfishes," by Roland L. Wigley and Paul Shave.

MEXICO

La Industria Pesquera en Mexico y el Contrato de Asociacion en Participacion con las Cooperativas (The Mexican Fishery Industry and the Contract of Association and Participation with the Cooperatives), 57 pp., illus., printed in Spanish, July 1965. Gustavo Martinez Cabanas, Torre Latinoamericana Piso 36, Mexico, D.F. In two parts: Part I contains sections on location and importance of fishery centers; production by species; export market for shrimp; and domestic consumption. Part II covers agreements between vessel owners and cooperatives.

MICHIGAN

Your Michigan Department of Conservation--What It Is, What It Does, 44 pp., illus., printed, Apr. 1966. Michigan Department of Conservation, Lansing, Mich. 48926. Contains, among others, a section on fish.

MIDWATER TRAWLS

Further Experiences with Midwater Trawls (June to December 1962), by J. Scharfe and R. Steinberg (translated by C. A. McLean), 55 pp., 1964, printed. (Translation from Protokolle zur Fischereitechnik, vol. 37, no. 8, 1963, pp. 161-230.) Fisheries Laboratory, Department of Agriculture, Fisheries and Food, Lowestoft, Suffolk, England.

MOTION PICTURES

Careers in Oceanography, 16 mm. color film, 28 minutes duration. Can be borrowed for public showing by written application to the Public Affairs Officer of any Naval Station. This documentary presentation depicts the challenge and adventure of oceanography. It stresses the many opportunities open in the field and delineates the paramount position oceanography plays in the defense of the United States. There is also a lucid explanation of its contribution to the civilian economy. The many sciences included in the field of oceanography are explained as well as the opportunities for meaningful careers. Also spotlights such ocean phenomena as a 50-foot tidal bore and huge underwater sea kelp.

NORWAY

"Rekordår för norskt fiske under 1965. Några utvecklingstendenser i fangst och fartygsbygge" (Record year for Norwegian fisheries during 1965. Some development trends in fishing and vessel building), by Lars Storleer, article, Svenska Västskustiskaren, vol. 36, no. 8, April 25, 1966, pp. 172-174, illus., printed in Swedish. George Åberg, Fiskhamnen, Goteborg V, Sweden.

"Trålfiske 1964--Melding fra Fiskeridirektoratet Kontoret for økonomiske undersøkelser og statistikk" (Trawl fishing--Report from the Fishery Department Office for Economic and Statistical Research), article, Fiskets Gang, vol. 52, April 1966, pp. 327-339, illus., printed in Norwegian. Fiskeridirektoratet, Rådstuplass 10, Bergen, Norway.

OCEANOGRAPHY

Oceanography--Science of the Future, by Rear Admiral O. D. Waters, Jr., USN, 17 pp., processed. U. S. Naval Oceanographic Office, Suitland, Md. An address at the commencement ceremony, Brevard Engineering College, Melbourne, Fla., June 15, 1966.

"Sea power and the sea bed," by John P. Craven, article, United States Naval Institute Proceedings, vol. 92, no. 4, April 1966, pp. 36-51, illus., printed, single issue \$1. U. S. Naval Institute, Annapolis, Md. 21402.

"The U. S. needs sea-grant colleges," by John A. Knauss, article, Undersea Technology, vol. 7, no. 5, May 1966, pp. 74-76, printed, single copy \$1.00. Compass Publications, Inc., Undersea Technology, 617 Lynn Bldg., 1111 No. 19th St., Arlington, Va. 22209.

The following Informal Manuscript Reports are available for limited distribution from the Marine Sciences Department, U. S. Naval Oceanographic Office, Washington, D. C. 20390:

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

An Oceanographic and Acoustic Study of a One-Degree Square off Point Conception, California, June 1963, by Don F. Fenner, Report No. 0-67-64, 50 pp., illus., processed, August 1965.

An Oceanographic and Acoustic Study of a One-Degree Square in the Western North Atlantic, by Roland E. Johnson, Report No. 0-9-65, 45 pp., illus., processed, September 1965.

Summary Field Report of Oceanographic and Bathymetric Operations in the Strait of Gibraltar, May-June and October-November 1964, by Louis A. Banchero and Donald A. Burns, Report No. 0-13-65, 61 pp., illus., processed, October 1965.

A Standard-Vector Deviation Rose Program for Current Data, by Donald A. Burns, Report No. 0-22-65, 19 pp., illus., processed, August 1965.

Theoretical Computations of Sound Reflection from a Layered Ocean Bottom, by Robert S. Winokur, Report No. 0-33-65, 21 pp., illus., processed October 1965.

OYSTERS

The Oyster-Based Economy of Franklin County, Florida, by Marshall R. Colberg and Douglas M. Windham, 28 pp., printed, July 1965. U.S. Department of Health, Education, and Welfare, Public Health Service, Washington, D. C. 20201.

"The Pacific Oyster," *Trade News*, vol. 18, no. 10-11, April-May 1966, pp. 13-14, illus., printed. Director of Information and Educational Service, Department of Fisheries, Ottawa 8, Canada.

"Les problemes de la production d'huitres plates en Bretagne" (The problems in the production of flat oysters in Brittany), by Louis Marteil, article, *Science et Pêche*, no. 147, April 1966, pp. 1-10, illus., printed in French, single issue 0.50 fr. (11 U.S. cents). L'Institut Scientifique et Technique des Pêches Maritimes, 59 Avenue Raymond-Poincaré, Paris 16, France.

PEARLS

Yearbook on Pearls 1966, 459 pp., printed in Japanese, April 1966, 2,000 yen (about US\$5.55), postage extra. Shinju Shinbunsha, 5-1, Sarugaku, Kanda, Chiyoda-ku, Tokyo, Japan. Describes production, marketing, and export trends; measures implemented to promote pearl culture and trade; and organizations involved. Japanese pearl exports in 1965 were valued at US\$55 million, about 34.5 percent of Japan's total value of all marine products exports. The United States was the chief buyer, followed by Switzerland and West Germany.

PESTICIDES

"Study indicates extended danger of pesticides," article *Journal of Milk and Food Technology*, vol. 29, Jan. 1966, p. 24, printed. *Journal of Milk and Food Technology*, P. O. Box 437, Shelbyville, Ind. 46176.

PROTEIN

"Protein hikes bring formula changes," by Henry R. Fiola, article, *Feedstuffs*, vol. 37, Aug. 14, 1965, pp. 1, 6, 7, printed. *Feedstuffs*, P. O. Box 67, Minneapolis, Minn. 55440.

RHODE ISLAND

"Rhode Island's cooperative fishing venture," by Jacob J. Dykstra, article, *Maritimes*, vol. 10, no. 2, spring 1966, pp. 7-11, illus., printed, Graduate School of Oceanography, University of Rhode Island, Kingston, R. I. 02832.

SALMON

Coho Salmon for the Great Lakes, by Wayne H. Tody and Howard A. Tanner, Fish Management Report No. 1, 38 pp., illus., processed, February 1966, Michigan Department of Conservation, Fish Division, Lansing, Mich. 48926.

"Fishing treaties and salmon of the North Pacific," by W. F. Thompson, article, *Science*, vol. 150, no. 3705, Dec. 31, 1965, pp. 1786-1789, illus., printed, single copy 35 cents. American Association for the Advancement of Science, 1515 Massachusetts Ave. NW., Washington, D. C. 20005. Present treaties, economic in intent, cannot be made effective for conservation without more knowledge, according to the author. This is an appeal for a rational approach to great problems which must be met in using the resources of the seas and which can only be solved by the use of basic biological principles, some of which date back to Darwin. It is hoped that those familiar with those principles--ecologists, geneticists, those studying speciation, geographical distribution, and population problems, and those in other related fields--will respond, and each lend his influence to formulation of a scientific basis for fisheries treaties and for conservation of our fisheries in general.

"Greenland salmon fishery," by Bruce Woodland, article *Trade News*, vol. 18, no. 5, Nov. 1965, pp. 5, 17, illus., printed. Director, Information and Consumer Service, Department of Fisheries, Ottawa, Canada.

SHRIMP

"El 'cultivo' de camarones" (The cultivation of shrimp), article, *Mar & Pesca*, vol. 2, November 1965, pp. 22-24, illus., printed in Spanish. Mar & Pesca, Amargura 103 esq. a San Ignacio, Havana, Cuba.

La Pesqueria de Camarones y Los Recursos Camaroneros de El Salvador (Hasta diciembre de 1962)--(The Shrimp Fishery and Shrimp Resources of El Salvador--up to December 1962), by Robert W. Ellis, Boletín de Pesca del Ministerio de Economía, No. 2, 59 pp., illus., printed in Spanish, December 1965. Government of El Salvador, San Salvador.

"Prawn industry for Nigeria?" by D.F.S. Raitt and D. R. Niven, article, *Fishing News International*, vol. 4, no. 4, Oct.-Dec. 1965, pp. 481-482, illus., printed, single copy 3s. 6d. (about 50 U.S. cents). Arthur J. Heighway Publications Ltd., Ludgate House, 110 Fleet St., London EC4, England.

SIERRA LEONE

Report on the Fisheries Division 1963, 19 pp., illus., June 1, 1964, 30 cents (about US\$0.45). Fisheries Division, Ministry of Natural Resources, Freetown, Sierra Leone. Sold by the Government Printing Department, Freetown, Sierra Leone. Reviews the activities and research of the Division, operation of the fisheries loan and credit scheme, and the

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several commercial fisheries in the country, including the trawl fishery and the tuna fishery. Several tables include data on the number of fishing vessels registered, landings by trawlers and by species, fish prices, a survey of the distribution of fish within the country, census of fishing gear, and fish imports and exports. Data are reported also on catch per unit of effort.

SMALL BUSINESS

Expanding Sales Through Franchising, Management Aid 182, by Al Lopin, Jr., 4 pp., printed, Mar. 1966, Small Business Administration, Washington, D. C. 20416. A report describing how franchising offers small companies a way to accelerate their growth and increase sales was issued recently by the Small Business Administration. In this method of distribution, the small manufacturer can obtain new outlets for his products by granting franchises to men who are also small businessmen. Subjects discussed in this Aid are: providing guidance for franchisees, testing a pilot operation, factors which determine the amount of money needed by the franchisee and franchisor, the franchise agreement, and training the franchisee.

SOUTH AFRICA

"SA fishing industry faces increasing challenge to supply domestic market" (Fisheries Development Corporation Annual Report 1964/65), article, The South African Shipping News and Fishing Industry Review, vol. XXI, no. 4, April 1966, pp. 91, 93, 95, 97, printed, single issue 30c, Thomson Newspapers, South Africa (Pty.) Ltd., P. O. Box 80, Cape Town, South Africa.

SPAIN

"Evolución de la pesca marítima en España" (Development of marine fisheries in Spain), by Mariano Lobo Andradá, article, Industria Conservera, vol. XXXII, no. 321, March 1966, pp. 67-70, printed in Spanish. Union de Fabricantes de Conservas de Galicia, Marqués de Valladores, 41, Vigo, Spain.

SPINY LOBSTER

"La langosta Cubana: Importante fuente de divisas" (The Cuban lobster: Important source of holdings), by Vincente Cubillas, article, Mar & Pesca, vol. 2, November 1965, pp. 6-13, illus., printed in Spanish. Mar & Pesca, Amargura 103 esq. a San Ignacio, Havana, Cuba.

"Marine crayfish or spiny lobsters of Australia," by R. W. George, article, Australian Fisheries Newsletter, vol. 25, no. 5, May 1966, pp. 25-28, illus., printed. Fisheries Branch, Department of Primary Industry, Canberra, A.C.T., Australia.

"Phospholipids of marine origin. II-The rock lobster (*Jasus lalandii*)," by A. J. de Koning and K. B. McMullan, article, Journal of the Science and Food and Agriculture, vol. 17, no. 3, March 1966, pp. 117, 120, printed, single issue £1 17s. 6d. (US\$5.27). Society of Chemical Industry, 14 Belgrave Square, London, SW1, England.

SPOILAGE

"Determination of trimethylamine nitrogen in extracts and in volatile fractions of fish," by Sammie Betha and Fred Hillig, article, Journal of the As-

sociation of Official Agricultural Chemists, vol. 48, Aug. 1965, pp. 731-735, printed. Association of Official Agricultural Chemists, Inc., Box 540, Benjamin Franklin Station, Washington, D. C. 20004.

SPONGES

"La esponja--su futuro desarrollo" (The sponge--its future development), by J. R. Savali, article, Mar & Pesca, vol. 2, November 1965, pp. 30-33, illus., printed in Spanish. Mar & Pesca, Amargura 103 esq. a San Ignacio, Havana, Cuba.

TEXAS

Let's Go Fishing, compiled by W. R. Long, 20 pp., printed, 1965. Information-Education Officer, Parks and Wildlife Department, 530 South Beckham, Tyler, Tex. 75701.

TOXINS

"Naturally occurring toxicants in foods," by O. Mickelsen and M. G. Yang, article, Federation Proceedings, vol. 25, January-February 1966, pp. 104-123, printed. Federation of American Societies for Experimental Biology, 9650 Wisconsin Ave. NW., Washington, D. C. 20014.

TROUT

"Storage life of vacuum-packed iced trout. II.--Influence of radiation pasteurisation," by B. V. Jørgensen and Poul Hansen, article, Journal of the Science of Food and Agriculture, vol. 17, no. 3, March 1966, pp. 140-141, printed, single issue £1 17s. 6d. (US\$5.27). Society of Chemical Industry, 14 Belgrave Square, London, SW1, England.

TUNA

"Técnica conservera: conservas de bonito" (Canning method: canning bonito), article, Industria Conservera, vol. XXI, no. 313, July 1965, pp. 187-190, illus., printed in Spanish, single copy 24 ptas. (about US\$ 0.40). Industria Conservera, Calle Marques de Valldares, 41, Vigo, Spain.

Annual Report of Effort and Catch Statistics by Area on Japanese Tuna Longline Fishery 1963, 322 pp., printed in Japanese, April 1966. Research Division, Fisheries Agency of Japan, Ministry of Agriculture and Forestry, 2-1, Kasumigaseki, Chiyoda-ku, Tokyo, Japan.

TURKEY

Balık ve Balıkçılık, vol. XIV, no. 5, May 1966, 31 pp., illus., printed in Turkish. Et ve Balık Kurumu G.M., Balıkçılık Müdürlüğü, Beşiktaş, İstanbul, Turkey. Includes articles on: "Deniz yosunlarından kırmızı algler (Kırmızı su yosunları) (Kisim V)" (The red algae--part V), by Hikmet Akgüneş, pp. 9-13; "Soguk ve Balıkçılık" (Coldstorage and fishing, application of quick freezing on board (part II)), by Mak. Y. Müh. Erol Ertas, pp. 17-21.

UNITED KINGDOM

Sea Fisheries Statistical Tables, 1964, 47 pp., printed, 1965, 7s. (about US\$1). Ministry of Agriculture, Fisheries and Food, London, England. (Available from Sales Section, British Information Services, 845 Third Ave., New York, N. Y. 10022.) Includes statistics on fish of British taking, imports and exports, and demersal and pelagic landings.

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U.S.S.R.

The Fishing Industry of the U.S.S.R., by V. Shparlin-ski, OTS 63-11122, 33 pp., processed, 1964. (Translated from the Russian, Moskva, 1959). Clearing-house for Federal Scientific and Technical Information, U. S. Department of Commerce, Braddock and Port Royal Rds., Springfield, Va. 22151.

Fishing News International, vol. 4, no. 4, Oct.-Dec. 1965, illus., printed, single copy 3s. 6d. (about 50 U.S. cents). Arthur J. Heighway Publications, Ltd., Ludgate House, 110 Fleet St., London EC4, England. Contains these articles on U.S.S.R. fisheries: "Focus on the Soviet fleet," by Peter Brady, pp. 392-400; "How Russia develops her fisheries and sea power," by W. M. Chapman, pp. 402-403; "Hybridization--a valuable contribution to Soviet economy," by N. L. Nikoljuki, pp. 473-474, 476.

VENEZUELA

La Biología y Pesquería del Camarón en la Zona Occidental (The Biology and Fishery for Shrimp in the Western Area), by Joseph Jay Ewald, 36 pp., illus., processed in Spanish, August 1964. Instituto Venezolana de Investigaciones Científicas, Caracas, Venezuela.

Fishery Production in Venezuela During the Months of January, February, March, and April of 1964, by Luis Rafael Salazar F., Boletín de Pesca No. 6, 76 pp., processed in Spanish, 1965, Ministerio de Agricultura y Cria, Direccion de Investigacion, Centro de Investigaciones Pesqueras, Cumano, Venezuela.

La Industria del Camaron en Venezuela (The Shrimp Industry in Venezuela), by Juan J. Pericchi Lopez, 85 pp., illus., processed in Spanish, 1965. Corporacion Venezolana de Fomento, Sub-Gerencia de Servicios Tecnicos, Unidad de Estudios (Div. Estudios Generales), Caracas, Venezuela. This book discusses the exploitation and processing of shrimp in Venezuela.

VESSELS

"Stability and crab fishing vessels," by B. F. Jensen, article, Pacific Fisherman, vol. 63, June 1965, pp. 32-35, printed. Pacific Fisherman, Editorial Office, 71 Columbia St., Seattle, Wash. 98104.

WHALING

"International Whaling Commission (Chairman's Report of the Seventeenth Meeting), article, Norsk Hvalfangst-Tidende (The Norwegian Whaling Gazette), no. 2, February 1966, pp. 25-31, printed in English. Norsk Hvalfangst-Tidende, Hvalfangerforeningen, Sandefjord, Norway.

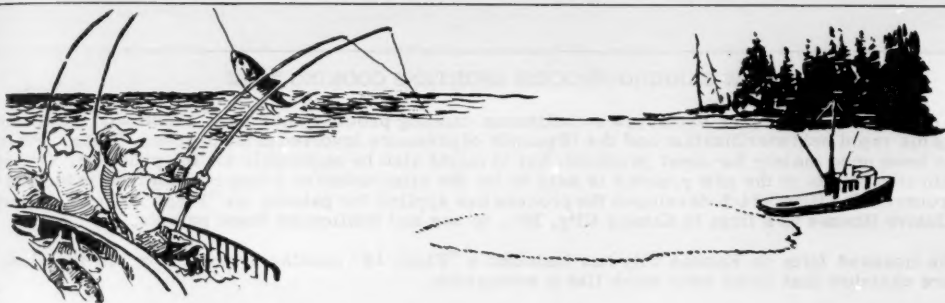
YUGOSLAVIA

Morsko Ribarstvo, vol. XVII, no. 11-12, November-December 1965, pp. 201-238, illus., printed in Serbo-Croatian. Morsko Ribarstvo, V. Bagata 3, P. O. Box 185, Rijeka, Yugoslavia. Includes articles on: "Eksploatacija oceanske ribarske flote" (Employment on high-seas fishing fleet), by P. Cetinić, pp. 223-230; "Najmladi kapetanprvi voda ribolova na oceanskom tunolovcu" (Our youngest captain-leader in high-seas tuna fishery), pp. 231-233.



STORING LIVE FISH AT SEA

The Soviet Union has been conducting experiments whereby it appears to be commercially feasible to store fish alive aboard fishing vessels at sea. This is done by transferring the live fish directly from the nets into specially built tanks in the hold of the vessel. These tanks contain sea water cooled by powerful refrigeration equipment. In addition, the sea water is monitored and treated by special bactericidal equipment. In recent experiments fish have been held alive in these tanks for as long as three days, thus assuring their delivery in prime condition to factoryships or ashore. Early experiments did not use refrigeration equipment but instead employed specially installed pumps and piping to draw cold, deep water from a considerable depth beneath the ocean's surface. Fish stored in tanks containing this water remained in first-class condition for a period of 24 hours. The experiments were conducted aboard the Soviet trawler Leshch and proved equally successful on two separate voyages. This method is now employed aboard the trawlers of the Sevastopol Administration of Marine Fisheries. This method has proved less expensive than conventional refrigeration, in terms of both initial and operating costs. It is hoped that future research will lead to storage times of up to a month or two... or, perhaps, for as long as half a year. This research is pioneered by V. Sopochkin of the Azov-Black Sea Marine Fisheries Administration. (Geo-Marine Technology, March 1966.



A fish is a cold-blooded, aquatic animal with fins, permanent gills (used for breathing in water), a backbone, and a skull. A shellfish is an aquatic animal with a shell, but it lacks fins, skull, and vertebrae.

Some fishing terms.--Fish are "commercial" when they are caught for the market; "sport" when they are caught for fun; and "rough" when they appear in abundance where not wanted. For example, a carp is a commercial fish in some areas where it is an article of food; a sport fish in some places where the usual sport fish are scarce; and a rough fish in many lakes and streams where it is crowding out trout and bass or other more desirable sport fish. Salmon, shad, and striped bass are commercial fish to some people and sport fish to others.

Fish can be classified as anadromous, catadromous, salt-water, or fresh-water. Anadromous species--salmon, alewives, striped bass, shad, steelhead trout--are hatched in fresh-water lakes or streams but mature in salt water and come back to fresh water to spawn, and some, like salmon, die after spawning. Catadromous species--like the American eel--live in fresh water and go to sea to spawn. Some fish, like halibut, tuna, and cod, spend their entire lives in the sea; others, like pike, smallmouth bass, and some trout, live only in fresh water.

Fish are also classified as food fish and industrial fish. Sometimes industrial fish become human food indirectly. Meal made from industrial fish is used in poultry feed and certain byproducts, or "solubles," are fed to young pigs.

About 200 species of fish and shellfish are used for food. American fishermen harvest 5 billion pounds of fish each year, about the same as do Russian and Chinese fishermen, but slightly less than half the catch of Japanese fishermen.

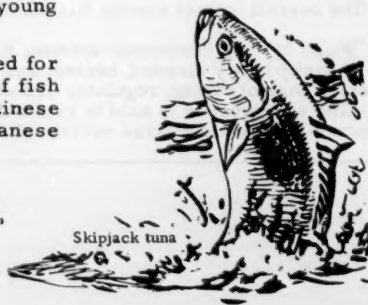
--Excerpt from "Our Commercial Fisheries," Conservation Note 2, Fish and Wildlife Service, U.S. Department of the Interior, Washington, D.C.



American shad



Blue crab



Skipjack tuna

NEW CANNING PROCESS SHORTENS COOKING TIME

A meat packing firm has developed a continuous canning process known as "Flash 18." The name denotes the rapid heat sterilization and the 18 pounds of pressure involved in the process. So far, "Flash 18" has been used mainly for meat products, but it might also be applicable to fish products. One of the main advantages of the new process is said to be the elimination of a long cooking time in the canning process. The firm which developed the process has applied for patents on "Flash 18" and issued an exclusive license to a firm in Kansas City, Mo., to use and sublicense those patents.

The licensed firm in Kansas City has installed a "Flash 18" canning system in a 110-foot-long pressure chamber that looks very much like a submarine.

Canning has been defined as the process of sterilizing food by heat, and preserving the food in hermetically-sealed containers. An important step in the conventional canning process has been the use of retorts (pressure cookers) for heat sterilization.

Under the new canning process, conventional retorting is completely eliminated. The "Flash 18" system installed by the Kansas City firm includes a continuous custom-built stuffer which feeds the product mixture under normal atmospheric pressure into pipelines which in turn feed into a pressure chamber. In the pipelines, and still outside the chamber, the mixture is raised to selected sterilization temperatures.

The rapid heating to above sterilization temperature in the pipelines does away with the necessity for a prolonged cooking period. The food moves from the pipelines into the pressure chamber. As it enters the chamber, the product goes into a deaerator. This is a device for removal of some of the air or oxygen from the product. With the removal of this air, volatile (readily vaporized) materials also are expelled. This is another important step in attaining homelike flavor and texture in canned products. It helps eliminate the characteristic "canned" flavor or harshness, sometimes related to the spices of strong-tasting components of canned items.

Within the pressure chamber, cans are filled and sealed by conventional machinery. The pressure in the room permits filling and sealing at 250° to 255° F. The cans are then fed to a lower level within the pressurized tank, to a "hot" chamber, where the residual heat is maintained for a short period to complete the process. After moving through this chamber, the sterilized cans are transferred mechanically to a precooling chamber, still within the pressure room. They then move out of the pressure chamber for final cooling.

A control room is a key factor in the new canning system. From the control room, operators direct product flow by means of modern regulators, temperature recorders and controllers, and automatic direction-control valves. Through microphones and telephones, control-room operators can talk to people inside the pressure chamber.

There are two main control boards. The first control board is concerned with product controls. The second control board is involved with the operation of the pressure system itself, room compressors, temperatures in the main chamber and personnel locks, and the status of the locks for introduction of materials on the side of the chamber.

The overall control system has numerous safety devices, including an evacuation alarm warning.

"Flash 18" is a continuous system. Although there is a "batching" of components, the product mixture is continuously blended, heated, and filled into cans moving through the pressure chamber. The elaborate control system regulates and adapts cooking time for each product passing through the system. The new process is said to retain delicate flavors and homemade texture and appearance to an exceptional degree in a large variety of canned foods.

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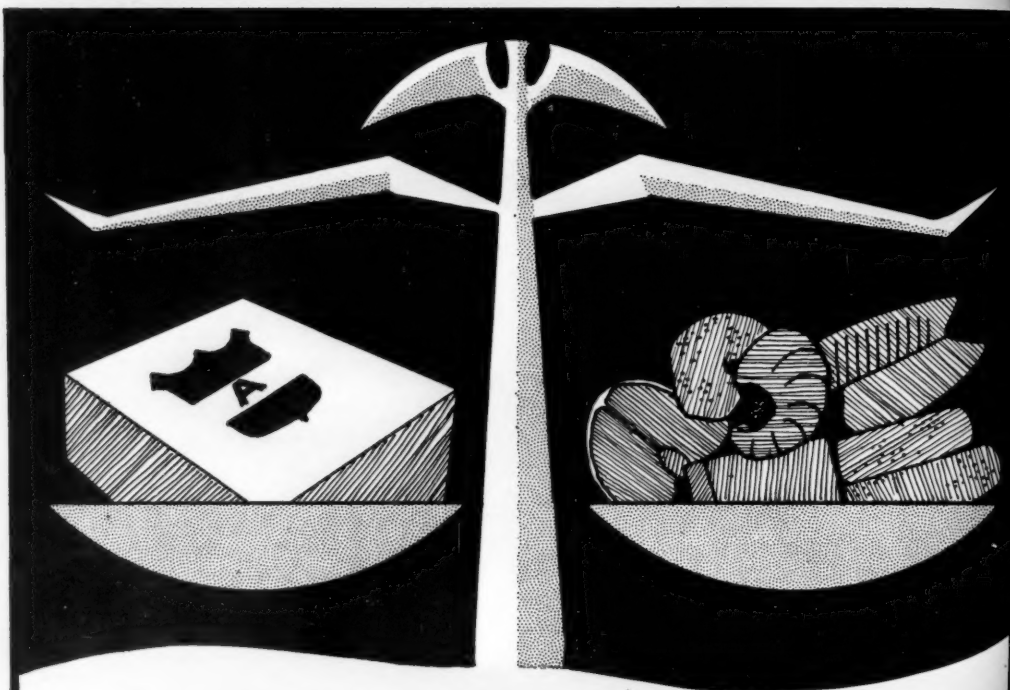
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STANDARDS

- Provide Uniform National Quality Levels to Aid Trading
- Represent Differences in Market Values
- Aid Processors in Establishing Quality Control Programs

